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MANUAL OF VASCULAR PLANTS OF THE LOWER YANGTZE VALLEY CHINA

MONGOLIA
MANCHURIA
KOREA
YELLOW RIVER
HONAN
KIANGSU
ANHWEI
HUPEH
NANKING
SHANGHAI
HANKOW
WUHU
HANGCHOW
YANGTZE RIVER
KIUKIANG
CHEKIANG
CHANGSHA
POYANG L.
HUNAN
KIANGSI
FORMOSA
BURMA
FRENCH
HAINAN
LUZON
SIAM
INDO-
CHINA
CHINA
500 MILES
LOWER YANGTZE VALLEY
R.L.

MANUAL OF VASCULAR PLANTS OF THE LOWER YANGTZE VALLEY CHINA

By

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Curator of the Herbarium

Oregon State College

OREGON STATE COLLEGE

CORVALLIS

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To

ELMER DREW MERRILL

Correspondent, administrator, bibliographer, explorer, teacher, author, adviser, botanist extraordinary and friend to scores of workers in the systematic botany of the Far East, without whose correspondence and tutelage this work would not have been undertaken, and whose assistance and wise counsel have greatly extended and increased its prospective usefulness, this book is respectfully dedicated.

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Albert N. Steward
Corvallis, Oregon

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INTRODUCTION

I. Geographical and Ecological Notes

Only limited studies have been made of the ecological and geographical distribution of plant life in China. One reason for this lies in our very incomplete knowledge of the systematic botany of this great area. The most active interest of botanists working in China has been to collect, identify and describe the plants of her varied flora.

Before the 1840's western plant collectors were able to secure material only from south China. Then came the explorations of that great introducer of Chinese plants to the West, Robert Fortune, 1843–1861. His early journeys to the regions about Shanghai, Hangchow and Ningpo were described as in the "northern provinces of China." On his latest trip, in 1861, he was able to visit Tokyo and Peking.

About 1900 there opened in China an era of expeditions by professional collectors of seeds and botanical specimens which covered large and varied areas in western China where the flora was much less disturbed by the activities of man than in central and eastern China. Some of these men made brief visits to Lu Shan, near Kiukiang, in northern Kiangsi, but their chief concern was for rich finds hidden in the mountainous regions farther west, in western Hupeh, Szechuan, Yunnan and Tibet.

In consequence there had been, until recent years, little intensive study of the plants of east-central China which includes the area we have designated "The Lower Yangtze Valley." (See accompanying map.) This is an area of large agricultural populations, resulting in the predominance of semi-natural rather than natural vegetation cover.

There remain in the extensive patchwork of semi-natural vegetation and cultivated or urban areas, which constitute the region, a few localities where considerable relics of more nearly natural vegetation remain. These are found mainly in the vicinity of several large Buddhist temples and in the very few mountain-top areas. Among the better known of these favorable collecting areas are: 1) Pau Hua Shan (elevation about 1,500 ft.), in Kiangsu, toward Shanghai from Nanking; 2) Chiu Hua Shan (elevation about 2,000 ft.), and Huang Shan (elevation about 7,000 ft.), in Anhwei, south of the Yangtze River above Wuhu; 3) Lu Shan (elevation about 4,500 ft.), in Kiangsi, between Kiukiang and Poyang Lake; 4) Vicinity of West Lake, in Chekiang, not far from Hangchow.

The references listed below include geographical and ecological comment which applies to our region:

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1924. Jacot, Arthur P. Biological survey by provinces. In China Journ. Sci. and Arts 2:337–341.
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1926. Hu, H. H. (Hu, Hsien-hsu). A preliminary survey of the forest flora of southeastern China. In Contrib. Biol. Lab. Sci. Soc. China 1(5):1–20.
1929. — . The nature of the forest flora of southeastern China. In Peking Soc. Nat. Hist. Bul. 4(1):47–56.
1931. Handel-Mazzetti, H. The phytogeographic structure and affinities of China. In Fifth Int. Bot. Congress, Cambridge, Rept. of Proc. pp. 513–517.

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1933. Sowerby, Arthur De C. The desert and the sown in China; Needed, a biological survey of China. In China Journ. 18:251–255; 305–306.

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1948. Teng, S. C. (Teng, Shu-ch'un). A provisional sketch of the forest geography of China. In Bot. Bul. Acad. Sin. 2(2):133–146. Map. Bibliog.

1952. Li, H. L. (Li, Hui-lin). Floristic relationships between eastern Asia and eastern North America. In Trans. Amer. Philos. Soc., new series 42(2):371–429. 56 maps. Bibliog.

II. Growth of the Manual

The Lower Yangtze Valley is a region of populous port cities where numerous schools, colleges and universities are located. For these schools a practical manual of the local flora, with keys and illustrations is an item of real need.

The first keys and enumeration of species from which this manual has developed were prepared as aids in the teaching of systematic botany for students in the College of Agriculture and Forestry, University of Nanking, Nanking, where the author was Professor of Botany from 1921 to 1950. From the start it was intended to include only species which could be satisfactorily keyed and recognized in the field. There unquestionably remain in the area scores of valid species to be clarified by further study.

One of the chief early problems in this situation was the lack of any manual or handbook keying and describing the vascular plants of that region. There were enumerations listing many of our species, e.g. Gee and Chien, "Plants of Kiangsu" and Forbes and Hemsley, "Index Florae Sinensis", but no source was available which brought together descriptions of the genera and species of our flora, and no keys had been constructed dealing with these plants except those produced by monographers of various technical groups, and these were widely scattered and often in sources not available in our limited libraries at Nanking.

"Gray's New Manual of Botany" together with Britton and Brown, "Illustrated Flora" (for eastern North America), and Hooker, "Flora of British India" were our most useful references for descriptions of genera in the local flora, and they covered only a limited portion of our plants. Except for cultivated plants and introduced weeds, few species descriptions were available to us.

Under these circumstances we were exceedingly fortunate in having the generous

help of Dr. E. D. Merrill, then Director and Botanist at the Bureau of Science, Manila, who over a period of fifteen years identified for us hundreds of specimens each year, enabling us to build a reference collection of authentically named specimens, which reached about 45,000 sheets by 1950.

With this growing herbarium collection for reference, with regular classes in systematic botany as a stimulus, and with the preparation of a manual as the objective, there has been progress through several preliminary stages. A list of families was followed by a synopsis of the families with keys to the genera. Later, keys to species were added, and notes included, for each species where possible, covering English common name, Chinese name, translation of meaning of Chinese name, reference to the most available species description, habit of growth, size, flowers and fruits, a diagnostic character, geographical distribution, habitat, and reference to uses for economic plants. Roman numerals are used to indicate the months of flowering and fruiting in the Lower Yangtze Valley. Dr. C. S. Fan and other able Chinese colleagues have prepared, in China, about 500 drawings of plants representing the diagnostic characters of different genera which effectively illustrate the manual.

The limitations of movement which have accompanied the conditions of warfare, occupation and revolution in East-Central China since 1937 have greatly restricted the field study needed for the completion of this Manual. Although this work must be regarded as in the nature of a preliminary flora, it is believed to be the first presentation for the area of a flora with keys and descriptions to families, genera and species. The present work covers 196 families, 871 genera and 1,959 species of vascular plants.

ABBREVIATIONS

aff.	affinis; related to.
brg.	branching.
brts.	branchlets.
Che.	Chekiang.
cm.	centimeter.
diam.	diameter.
dm.	decimeter.
emend.	emended.
f.	forma.
fl.	flower.
fld.	flowered.
flg.	flowering
fr.	fruit.
frtg.	fruiting.
Hon.	Honan.
Hun.	Hunan.
Hup.	Hupeh.
infl.	inflorescence.
Ki.	Kiangsi.
Ku.	Kiangsu.
lf.	leaf.
lfts.	leaflets.
lfy.	leafy.
lvs.	leaves.
m.	meter.
mm.	millimeter.
pr.	pair.
ssp.	subspecies.
var.	variety.

KEY TO THE FAMILIES AND ABERRANT GENERA

1a. Plants without flowers or seeds, reproducing by means of spores... I. PTERIDOPHYTA
1b. Plants with flowers that produce seeds..... II. SPERMATOPHYTA

I. PTERIDOPHYTA

1a. Sporangia borne in strobili, axils of lvs., sporocarps, or on spike-like branches.
2a. Plants aquatic.
Floating on water: lvs. small: sporocarps borne on under-side of stem..... 6. *Salviniaceae*, p. 46
Rooting in mud of ponds or ditches (may be dry for a part of the year).
Lvs. quadrifoliolate: rhizome widely creeping: sporocarps borne near base of leaf stalk. ..... 5. *Marsileaceae*, p. 46
Lvs. elongate, grass-like, in rosettes: stem corm-like: sporangia borne in base of the lvs..... 4. *Isoetaceae*, p. 45
2b. Plants terrestrial.
3a. Sporangia borne in strobili or in axils of lvs.
Stems jointed, hollow: only a whorl of scale-like lvs. at the nodes: strobili terminal; rush-like plants..... 1. *Equisetaceae*
Stems not jointed, creeping or erect: lvs. very small, closely imbricated.
Spores of one type: lvs. uniform. ..... 2. *Lycopodiaceae*
Spores of two sizes: median and lateral lvs. usually dimorphic..... 3. *Selaginellaceae*
3b. Sporangia borne on a simple or pinnately branched fertile segment: sterile blade simple or compound..... 7. *Ophioglossaceae*
1b. Sporangia borne on the back or margins of foliage lvs. or on specialized leaves which usually lack chlorophyll.
4a. Plants aquatic, submersed and rooting in mud or floating: sori marginal, covered by reflexed leaf margin..... 12. *Ceratopteridaceae* (Parkeriaceae)
4b. Plants terrestrial.
5a. Rachis indeterminate, long and twining; pinnae palmately or pinnately lobed; fertile lft. segments contracted. ..... 9. *Schizaeaceae*
5b. Rachises determinate, not twining.
6a. Fertile lvs. conspicuously unlike the sterile.
Fertile lvs. or fertile portion of lvs. bipinnate; sporangia borne in irregular compound clusters (not on the back of leaf blades); dehiscence by a vertical slit..... 8. *Osmundaceae*
Fertile lvs. pinnate; sporangia borne on the back of contracted pinnae; dehiscence by a transverse slit.
Rhizome and stipe without scales: sterile lf. pinnate: fertile pinnae with very narrow indusia. ..... 13. *Plagiogyriaceae*
Rhizome and stipe scaly: sterile lf. pinnate to bipinnatifid: fertile pinnae with broad coriaceous reflexed margins..... 14. *Onocleaceae* (Matteuccia)
6b. Fertile lvs. and sterile lvs. essentially alike.
7a. Leaf-blades thin: sori marginal: indusia tubular or bilabiate. 11. *Hymenophyllaceae*

7b. Leaf-blades foliaceous, of more than one layer of cells.
8a. Lvs. pseudo-dichotomously branched: sori exindusiate: sporangia subsessile: annulus transverse, not interrupted by stalk. ..... 10. *Gleicheniaceae*
8b. Lvs. simple or compound, usually pinnately compound, never dichotomously forked: sori marginal or on the back of lvs., with or without indusia: sporangia long-stalked; annulus interrupted by the stalk.
9a. Sori marginal or submarginal.
10a. Lvs. linear, grass-like: sori in a continuous marginal groove. ..... 19. *Vittariaceae*
10b. Lvs. not simple and linear.
11a. Sori protected by the reflexed margin of the lf. .. 17. *Pteridaceae*
11b. Sori not protected by the reflexed margin.
12a. With indusia.
13a. Indusia cup-like.
Rhizome provided with large peltate multicellular scales: indusium opening at the end or at sides as well as at the end... 16. *Davalliaceae*
Rhizome with hairs of 1 cell-row or very narrow scales only 2–3 cells wide at base: indusium opening at the end. .. 15. *Dennstaedtiaceae*
13b. Indusia reniform.
Pinnae articulate to the rachis..... *Nephrolepis*
Pinnae not articulate to the rachis..... 24. *Aspidiaceae*
12b. Without indusia.
Lvs. and rhizomes without scales or true hairs. 21. *Monachosoraceae*
Lvs. pubescent. ..... *Thelypteris*
9b. Sori dorsal.
14a. Sori linear.
15a. Indusia present.
Sori parallel to midribs of pinnae and pinnules, straight. ..... 22. *Blechnaceae*
Sori parallel to veins, oblique to midribs of pinnae and pinnules, straight, curved, or reniform. ..... 20. *Aspleniaceae*
15b. Indusia absent.
16a. Sporangia following the veinlets, reaching from near costa to near margin. ..... 18. *Gymnogrammaceae*
16b. Sporangia in definite sori, not borne along every veinlet.
17a. Sori parallel to midrib: lvs. narrow, linear.
With stellate hairs on lamina. ..... *Saxiglossum*
Without stellate hairs. ..... 19. *Vittariaceae*
17b. Sori oblique to midrib, parallel to veins.
Lvs. alternate, not crowded, internodes may be long or short..... 25. *Polypodiaceae*
Lvs. fasciculate, i.e. closely crowded on the short rhizome.
Lf. blades pubescent. ..... *Leptogramma*
Lf. blades glabrous. ..... *Cornopteris*
14b. Sori round, or reniform.
18a. Indusia absent.
Veins free: scales non-clathrate. ..... *Thelypteris*

Veins usually anastomosing: scales usually clathrate. ..... 25. *Polypodiaceae*

18b. Indusia usually present.

Indusium inferior, globose with apical opening, or cleft into narrow segments. ..... 23. *Woodsiaceae*

Indusium superior, orbicular or reniform, sometimes caducous or absent.

Pinnae articulate to the rachis..... *Nephrolepis*

Pinnae non-articulate to the rachis..... 24. *Aspidiaceae*

II. SPERMATOPHYTA

1a. Ovules naked, not enclosed in an ovary; producing seeds on the face of a scale or bract: stigmas none..... A. GYMNOSPERMAE

1b. Ovules borne in a closed ovary, which at maturity becomes the fruit: stigmas present..... B. ANGIOSPERMAE

A. GYMNOSPERMAE

1a. Lvs. pinnately divided, evergreen: trunk short, usually unbranched: plants palm-like (Cycadales). ..... 26. *Cycadaceae*

1b. Lvs. simple: plants not palm-like.

2a. Seeds 1 (or rarely 2). drupe-like: embryo with 2 cotyledons.

3a. Lvs. fan-shaped, deciduous: tree with large trunk, deliquescent at maturity: seed drupe-like (Ginkgoales). ..... 27. *Ginkgoaceae*

3b. Lvs. scale-like, awl-shaped or needle-like, mostly evergreen: excurrent trees or shrubs (Coniferae).

Anthers 2-celled: seeds solitary, axillary or terminal on lfy. shoots, surrounded by a fleshy aril: lvs. 3–10 cm. long. 29. *Podocarpaceae*

Anthers 3–8-celled: lvs. 2–8 cm. long.

Lvs. with 2 narrow stomatiferous bands beneath, 2–4 cm. long: seed solitary, terminating a short shoot of the infl., partly or wholly surrounded by a fleshy aril: anthers 2–8-celled: brts. alternate or sub-opposite. .. 28. *Taxaceae*

Lvs. with 2 whitish stomatiferous bands beneath broader than the 3 green lines, 2–8 cm. long: seeds 1 or 2; testa with a fleshy outer layer and a thin woody inner layer: brts. opposite. ..... 30. *Cephalotaxaceae*

2b. Seeds 2–several, on the scales of a woody or berry-like cone (ovulate strobilus): embryo with 2–15 cotyledons.

Cone scales imbricated, each subtended by a bract: seeds 2 to each scale, winged: lvs. linear, needle-like, alternate or in fascicles. ..... 31. *Pinaceae*

Cone scales peltate or imperfectly imbricated, without bracts: lvs. often acicular or scale-like.

Lvs. linear or subulate, spirally arranged or in opposite prs., often appearing in 2 ranks: seeds winged. ..... 32. *Taxodiaceae*

Lvs. mostly small and scale-like, often decurrent: seeds without wings..... 33. *Cupressaceae*

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B. ANGIOSPERMAE

1a. Cotyledons 2: vascular bundles arranged in rings: lvs. net-veined. a. DICOTYLEDONEAE
1b. Cotyledons 1: vascular bundles scattered: lvs. usually parallel-veined. ..... b. MONOCOTYLEDONEAE, p. 19

a. DICOTYLEDONEAE

1a. Perianth none, or of a single whorl; or if of two whorls, the inner (corolla) of separate petals..... (1) ARCHICHLAMYDEAE
1b. Perianth of two whorls; calyx and corolla both present; the petals more or less united. ..... (2) METACHLAMYDEAE, p. 16

(1) Archichlamydeae

1a. Perianth absent, or of a single whorl regarded as the calyx. (1b, p. 10)
2a. Fls., at least the staminate or the pistillate ones, in catkins or globose heads: trees or shrubs.
3a. Staminate and pistillate fls. both in catkins or globose heads.
Fr. a capsule.
Frtg. spike elongated, cylindric: capsules 1-celled, with many hairy-tufted seeds: dioecious trees or shrubs... 36. *Salicaceae*
Frtg. spike globose: capsules 2-celled, woody, with 1 or 2 winged seeds: monoecious trees. ..... *Liquidambar*
Fr. a fleshy syncarp: a dioecious tree or shrub. ..... 37. *Myricaceae*
3b. Staminate fls. only in catkins.
Lvs. pinnately compound, estipulate: fr. drupe-like or nut-like..... 38. *Juglandaceae*
Lvs. simple, with deciduous stipules: fr. a nut.
Nut small and compressed, or larger and enclosed by a leaf-like involucre..... 39. *Betulaceae*
Nut large and partly or wholly enclosed by a scaly or bristly involucre..... 40. *Fagaceae*
2b. Fls. not in catkins or globose heads: trees, shrubs, or herbs.
4a. Ovary superior: fls. regular. (4b, p. 10)
5a. Plants with milky or colored sap: lvs. mostly alternate.
Ovary 1-celled.
Fr. a fleshy syncarp or syconium: trees and shrubs with milky sap..... 42. *Moraceae*
Fr. a capsule: tall herb with colored sap. ..... *Macleya*
Ovary 3-celled: fr. a capsule or berry: fls. unisexual..... 91. *Euphorbiaceae*
5b. Plants with watery sap: lvs. alternate or opposite.
6a. Fls. unisexual. (6b, p. 9)
7a. Plants aquatic, submersed herbs.
Lvs. verticillate, dissected into linear divisions; sterile fls. with 10-20 stamens: ovary 1-celled: style one. 58. *Ceratophyllaceae*
Lvs. opposite, entire: sterile fls. with one stamen: ovary 4-celled: styles two..... 93. *Callitrichaceae*
7b. Plants terrestrial.
8a. Fr. a samara, drupe, achene or utricle.

9a. Fr. winged, a samara: trees with alternate simple lvs. ..... 41. *Ulmaceae*

9b. Fr. a drupe, achene or utricle.

10a. Fr. a drupe: lvs. alternate.

Lvs. simple: fr. a drupe or samara.

Plants woody, trees: lvs. often oblique: stone of fr. not crescent-shaped. ..... 41. *Ulmaceae*

Plants apparently herbaceous, climbing vines: stone of fr. crescent-shaped. ..... 64. *Menispermaceae*

Lvs. pinnately compound: fr. a drupe, variously colored. ..... *Pistacia*

10b. Fr. an achene or utricle.

11a. Lvs. palmately lobed or divided: erect or twining herbs. ..... 43. *Cannabinaceae*

11b. Lvs. simple, pinnately veined: erect herbs or shrubs.

Perianth not enlarged or winged in fr.: stipules not sheathing. ..... 44. *Urticaceae*

Perianth or its associated bracts spiny, enlarged or winged in fruit.

Stipules sheathing the stem: fr. an achene, subtended by the winged perianth. .... *Rumex*

Stipules none: fr. a utricle, enclosed in a spiny capsule-like body. ..... *Spinacia*

8b. Fr. a capsule or berry.

12a. Woody vines with alternate palmately compound lvs.

Carpels few, becoming large 1-seeded berries. .. 61. *Lardizabalaceae*

Carpels many, becoming stipitate 1-seeded berries. 62. *Sargentodoxaceae*

12b. Trees, shrubs or herbs, not vines.

13a. Plants spiny: trees or shrubs with alternate lvs.

Lvs. pinnately compound or trifoliolate, punctate with glandular dots..... *Zanthoxylum*

Lvs. simple, not punctate, evergeen. ..... *Xylosma*

13b. Plants unarmed.

14a. Lvs. trifoliolate; trees with berry-like fr..... *Bischofia*

14b. Lvs. simple.

15a. Plants evergreen: shrubs or trees. ..... 92. *Buxaceae*

15b. Plants deciduous or herbaceous.

Fr. a capsule, dehiscent. ..... 91. *Euphorbiaceae*

Fr. a fleshy berry.

Shrub: berries solitary in the axils of small (1–5 cm. long) glabrous entire lvs. ..... *Phyllanthus*

Tree: berries in terminal panicles: lvs. alternate, large (7–15 cm. long), densely short-hairy beneath; margins more or less coarsely serrate or dentate.....114. *Flacourtiaceae*

6b. Fls. bisexual or polygamous.

16a. Fr. an achene, an aggregation of achenes, or a utricle.

17a. Plants with sheathing stipules (ocreae): lvs. alternate. 49. *Polygonaceae*

17b. Plants without sheating stipules.

18a. Fr. a utricle.

Bracts of the infl. none, or not scarious. ..... 50. *Chenopodiaceae*

Bracts of the infl. and sepals scarious. ..... 51. *Amaranthaceae*

18b. Fr. an achene.
Fls. solitary or few: fr. an aggregation of achenes. 60. *Ranunculaceae*
Fls. many, in a dense head or spike: fr. a solitary achene, closely surrounded by the calyx tube. *Sanguisorba*
16b. Fr. a follicle, capsule, berry or drupe.
19a. Perianth absent.
Lvs. alternate: fls. in a dense spike, subtended by one or more showy white or cream-colored leaf-like or petaloid bracts: herbs. ..... 34. *Saururaceae*
Lvs. opposite: fls. not subtended by showy bracts: herbs or shrubs. ..... 35. *Chloranthaceae*
19b. Perianth present.
20a. Floral envelope deciduous, sometimes none: fr. flattened, 2-seeded: lvs. alternate. ..... *Lepidium*
20b. Floral envelope persistent.
21a. Perianth herbaceous: fr. a many-seeded 5-celled capsule: lvs. alternate. ..... *Penthorum*
21b. Perianth petal-like.
22a. Herbs or woody vines.
23a. Lvs. alternate.
A stout erect herb: fr. a berry. ..... 52. *Phytolaccaceae*
A woody vine: fr. a 5-ribbed achene. .... *Bougainvillea*
23b. Lvs. opposite or whorled.
Fr. indehiscent, enclosed by the base of the perianth. ..... 53. *Nyctaginaceae*
Fr. dehiscent, not enclosed. ..... 54. *Aizoaceae*
22b. Trees or shrubs.
Stamens distinct: ovary 1-celled, 1-seeded: fr. a drupe.
Anthers opening by valves: perianth 6-parted, without petals. ..... 69. *Lauraceae*
Anthers opening by slits: perianth tubular... 119. *Thymelaeaceae*
Stamens united into a tube: carpels separate below, becoming follicles in fr. ..... 108. *Sterculiaceae*
4b. Ovary inferior.
24a. Shrubs or trees.
Lf. blades covered with silvery or brown scales, alternate.. 120. *Elaeagnaceae*
Lf. blades not scaly.
Lvs. alternate: fr. a woody capsule. ..... 78. *Hamamellidaceae*
Lvs. opposite: shrubs, parasitic on trees: fr. a 1-seeded berry or drupe. ..... 47. *Loranthaceae*
24b. Herbs or vines.
Plants aquatic or of marshes, with lfy. stems and many minute fls. ..... 129. *Haloragidaceae*
Plants terrestrial, of grassland or moist woods: lvs. alternate or basal.
Low branching herbs with narrow linear lvs.: fls. small, 3-5 mm. long: parasitic on roots. ..... 45. *Santalaceae*
Acaulescent herbs or vines with broad cordate lvs.: fls. large, 2-3 cm. long. ..... 48. *Aristolochiaceae*
1b. Perianth of two whorls: both calyx and corolla present, or the perianth petaloid.
25a. Fls. unisexual; plants monoecious or dioecious.
26a. Lvs. pinnately compound.

Fr. of 4–5 dehiscent follicles: lvs. opposite. ..... *Evodia*
Fr. of green, red and purple drupes: lvs. alternate. ..... 94. *Anacardiaceae*

26b. Lvs. simple, alternate.
Plants monoecious: fr. a globose syncarp of 1-seeded nutlets: trees with palmately lobed lvs..... 79. *Platanaceae*
Plants dioecious: shrubs or trees with pinnately veined lvs.: fr. a drupe.
Fls. axillary, solitary, fascicled or in cymes. ..... 95. *Aquifoliaceae*
Fls. in fascicles on the upper surface of the lf. blades... *Helwingia*

25b. Fls. perfect.

27a. Ovary superior, free from the calyx, above or surrounded by, but not united with the receptacle. (27b, p. 15)

28a. Plants aquatic, large herbs with peltate or floating lvs.: sepals, petals, stamens and carpels several to many. .. 59. *Nymphaeaceae*

28b. Plants terrestrial.

29a. Sap of plants acrid, resinous, milky or colored.
Herbs: sepals 2: fls. large..... 70. *Papaveraceae*
Shrubs or trees: sepals 3–5: fls. small. ..... 94. *Anacardiaceae*

29b. Sap of plants watery.

30a. Fr. a pod (legume), usually dehiscent: fls. mostly irregular: lvs. alternate..... 81. *Leguminosae*

30b. Fr. not a legume.

31a. Vines, herbaceous or woody.

32a. Herbaceous vines, sometimes fleshy: lvs. alternate.

33a. Vines twining, without tendrils: lvs. simple.
Fls. regular: lvs. not peltate: sepals 2: fr. 1-seeded, indehiscent: plant fleshy..... 56. *Basellaceae*
Fls. very irregular: lvs. peltate: sepals 5: fr. of 3 1-seeded carpels. ..... 84. *Tropaeolaceae*

33b. Vines with tendrils.
Lvs. biternately compound: sepals 4: fr. a 3-celled membranous inflated capsule with several seeds. ..... *Cardiospermum*
Lvs. simple, palmately lobed or cleft: sepals 5: ovary stipitate: fr. a 1-celled many-seeded berry. .....116. *Passifloraceae*

32b. Woody vines.

34a. With tendrils: lvs. palmately veined or compound, alternate: stamens opposite the valvate petals. '04. *Vitaceae*

34b. Without tendrils: lvs. simple, never palmately veined.

35a. Fr. a dehiscent capsule. ..... 96. *Celastraceae*

35b. Fr. indehiscent: lvs. alternate.
Fr. a fleshy many-seeded berry 2–4 cm. long: stamens many: lvs. large and broad, 5–12 cm. long. .....109. *Actinidiaceae*
Fr. a drupe: lvs. ovate-lanceolate, 1–5 cm. long.
Lvs. prominently pinnately-nerved: calyx lobes or sepals valvate..... *Berchemia*
Lvs. not prominently nerved: calyx lobes or sepals imbricate. ..... *Sabia*

31b. Trees, shrubs or herbs, not vines.

36a. Sepals 2: herbs.

Petals 5: lvs. entire, flat or terete: plants succulent. ..... 55. *Portulaceae*
Petals 4: lvs., at least the lower ones, finely divided or decompound, alternate.
Fls. regular: lvs. finely divided: sepals joined into a pointed hood and falling as the fl. opens. ..... *Eschscholzia*
Fls. irregular: lower lvs. decompound: sepals small and scale-like. ..... 71. *Fumariaceae*

36b. Sepals 5 or 4.
37a. Gynoecium of few to many free carpels: stamens free.
38a. Carpels several to many, forming an aggregate fr.
39a. Stamens 5 or 6: deciduous shrubs with opposite entire lvs.: fls. solitary or in pairs at the nodes, developing before the lvs..... 68. *Calycanthaceae*
40a. Stamens attached to the convex or cylindric receptacle: sepals free.
41a. Plants herbaceous: sepals 5 or more..... 60. *Ranunculaceae*
41b. Plants woody: sepals 3: lvs. alternate.
Carpels or pistils spirally arranged on a more or less elongated axis.
Fr. capsular: stipules present, large, enclosing the succeeding young leaf: fls. perfect: trees or shrubs. 65. *Magnoliaceae*
Fr. berry-like: stipules wanting: fls. unisexual: twining shrubs. ..... 66. *Schisandraceae*
Carpels in a single whorl around a short axis: fls. perfect: fr. of woody follicles: trees or shrubs..... 67. *Illiciaceae*
40b. Stamens attached to the calyx cup (hypanthium): sepals united below: herbs or shrubs: lvs. alternate. ..... 80. *Rosaceae*
38b. Carpels few, not more than 5.
42a. Carpels 1: fr. an achene, drupe, berry or capsule: lvs. alternate.
Stamens few, opposite the petals; anthers opening by hinged valves: fr. a berry or capsule..... 63. *Berberidaceae*
Stamens many; anthers not opening by hinged valves: fr. an achene or drupe. 80. *Rosaceae*
42b. Carpels 2–5: fr. a follicle.
Stamens numerous, attached to the convex or cylindric receptacle: sepals free..... 60. *Ranunculaceae*
Stamens few, not more than 2×the petals, attached to the calyx: sepals united below.
Carpels as many as the sepals: plants usually succulent. ..... 75. *Crassulaceae*
Carpels fewer than the sepals: plants not succulent. ..... 76. *Saxifragaceae*

37b. Gynoecium consisting of a compound ovary, the carpels united or separating at maturity.
43a. Stamens free. (For 43b see p. 15.)
44a. Carpels splitting apart at maturity.
45a. Fr. consisting of nutlets.
Nutlets bearing the persistent styles at maturity. ..... 82. *Geraniaceae*
Nutlets bearing stiff spines at maturity: lvs. opposite. ..... 86. *Zygophyllaceae*
45b. Fr. consisting of samaras.
Carpels 5–6, united or free below: fr. consisting of 1–6 free samaras: lvs. alternate..... *Ailanthus*
Carpels 2: fr. consisting of 2 samaras which separate at maturity: lvs. opposite..... 98. *Aceraceae*
44b. Carpels not separating at maturity.
46a. Stamens numerous.
Fls. in axillary or terminal clusters.
Fls. in axillary racemes: anthers linear. 105. *Elaeocarpaceae*
Fls. in terminal and lateral cymes; anthers suborbicular..... *Grewia*
Fls. usually solitary, sometimes in axillary clusters.....110. *Theaceae*
46b. Stamens few, not more than 10, nor more than 2×the petals.
47a. Fls. regular.
48a. Herbs: fr. a capsule.
49a. Fls. tetradynamous (with 6 stamens, 2 shorter than the other 4): lvs. alternate. ..... 73. *Cruciferae*
49b. Fls. not tetradynamous.
50a. Lvs. simple.
51a. Leaf-blades not peltate, not bearing tentacle-like glandular hairs.
52a. Styles 2–5: lvs. opposite, entire. 57. *Caryophyllaceae*
52b. Styles 1.
53a. Lvs. alternate.
Stamens all fertile..... *Corchorus*
Stamens not all fertile, half of them with sterile anthers. ..... *Corchoropsis*
53b. Lvs. opposite or basal.
Lvs. opposite, entire: erect herbs: fls. in axillary clusters. .....111. *Lythraceae*
Lvs. mostly basal: fls. on an erect scape: anthers opening by terminal pores. .....134. *Pyrolaceae*
51b. Leaf-blades peltate, bearing tentacle-like glandular hairs. 74. *Droseraceae*

50b. Lvs. compound, alternate.

Lfts. 5: capsule slender, long-stalked. ..... 72. *Capparidaceae*

Lfts. 3: capsule oblong, sessile... 83. *Oxalidaceae*

48b. Shrubs or trees.

54a. Lvs. simple, or 1-foliolate.

55a. Leaf-blades scale-like or needle-like, alternate: fr. a dehiscent capsule with densely hairy seeds.....112. *Tamaricaceae*

55b. Leaf-blades flat, not scale-like or needle-like.

56a. Lvs. alternate.

57a. Infl. axillary, of fascicles, cymes or racemes.

58a. Fr. a hesperidium (with leathery rind). ..... 87. *Rutaceae*

58b. Fr. a drupe or berry.

Leaf-blades entire: fr. a drupe: fls. in axillary racemes: stamens epipetalous..... 46. *Olacaceae*

Leaf-blades finely or coarsely serrate.

Fls. in axillary cymes (also terminal in *Hovenia* and *Paliurus*) or fascicles, or solitary: fr. a drupe, capsule or samara. ..103. *Rhamnaceae*

Fls. in pendulous racemes: fr. a berry with arillate seeds.....115. *Stachyuraceae*

57b. Infl. of dense terminal panicles or racemes.

Fr. a drupe: lvs. entire. .... *Skimmia*

Fr. a 3-celled capsule: lvs. serrate. .....133. *Clethraceae*

56b. Lvs. opposite or the upper alternate.

Fls. large and showy: petals crisped, with a long slender claw..... *Lagerstroemia*

Fls. small, in axillary clusters. 103. *Rhamnaceae*

54b. Lvs. compound.

59a. Arrangement of lvs. alternate.

Stamens 8–15.

Lvs. with pellucid dots: fls. axillary, solitary, fascicled or in leafy panicles. ..... 87. *Rutaceae*

Lvs. without pellucid dots: fls. in ample leafless terminal or axillary panicles. .....100. *Sapindaceae*

Stamens 4–5: lvs. and bark with bitter taste. ..... 88. *Simarubaceae*

59b. Arrangement of lvs. opposite.

Lvs. pinnately compound, stipulate: fls. regular..... 97. *Staphyleaceae*

Lvs. palmately compound, estipulate: fls. irregular..... 99. *Hippocastanaceae*

47b. Fls. irregular: fr. a capsule or drupe: lvs. alternate.

60a. Lvs. simple.

Shrubs or trees: fr. a drupe.....101. *Sabiaceae*

Herbs: fr. a capsule.

Stout erect succulent annuals, to 1 m. high. .....102. *Balsaminaceae*

Stemless or slender branching perennials, to 3 dm. high.....113. *Violaceae*

60b. Lvs. pinnately compound: trees: capsule bladder-like..... *Koelreuteria*

43b. Stamens united.

61a. Stamens 4–15.

62a. Lvs. pinnately 1–3×compound, estipulate: trees: fls. regular..... 89. *Meliaceae*

62b. Lvs. simple: herbs, or low shrubs.

63a. Fls. irregular: lvs. entire, estipulate: low shrubs. ..... 90. *Polygalaceae*

63b. Fls. regular: mostly herbs.

Lvs. entire; stipular glands often present. 85. *Linaceae*

Lvs. serrate or dentate; stipules present, often deciduous.

Stamens 5..... *Melochia*

Stamens 10–15..... *Corchoropsis*

61b. Stamens numerous.

64a. Filaments united into a column surrounding the styles. .....107. *Malvaceae*

64b. Filaments united at the base into 5 bundles.

Lvs. alternate, serrate.....106. *Tiliaceae*

Lvs. opposite, entire.....111. *Guttiferae*

27b. Ovary inferior: surrounded by and united with the calyx or receptacle. (27a, p. 11)

65a. Stamens numerous, more than 10.

66a. Stems without foliage lvs., fleshy, often spiny: fls. with many sepals and petals. .....118. *Cactaceae*

66b. Stems with foliage lvs., succulent or woody.

67a. Plants succulent, with broad alternate inequilateral lvs. and unisexual fls.: fr. a winged capsule. .....117. *Begoniaceae*

67b. Plants woody.

Lvs. with stipules, alternate: fr. a pome..... 80. *Rosaceae*

Lvs. without stipules.

Fr. a large leathery berry with seeds surrounded by fleshy pulp: stems usually thorny: lvs. opposite or fascicled. .....122. *Punicaceae*

Fr. a capsule: sepals and petals connate, falling off as a lid: aromatic plants: lvs. opposite.....125. *Myrtaceae*

65b. Stamens few, not more than 10.

68a. Fls. not in umbels.
69a. Styles 2–5: fls. mostly 5-merous..... 76. *Saxifragaceae*
69b. Styles 1: fls. often 4-merous.
70a. Fr. dry.
71a. Trees and shrubs.
Fls. in terminal panicles or corymbs: fr. a capsule. 76. *Saxifragaceae*
Fls. in heads: fr. a samara; lvs. alternate..... *Camptotheca*
71b. Herbs.
Lvs. conspicuously 3–7-nerved, opposite: anthers of various shapes, opening by apical pores...126. *Melastomaceae*
Lvs. not 3–7-nerved: anthers not conspicuously modified.
Plants terrestrial.....127. *Onagraceae*
Plants aquatic, floating: submersed lvs. opposite, finely dissected. .....128. *Hydrocaryaceae*
70b. Fr. fleshy, drupaceous.
Species polygamo-dioecious.....123. *Nyssaceae*
Species with perfect fls.
Lvs. oblique or lobed, alternate: petals and stamens usually 6. .....124. *Alangiaceae*
Lvs. not oblique or lobed, usually opposite: petals and stamens usually 4.....132. *Cornaceae*
68b. Fls. in umbels: petals and stamens 5: lvs. alternate.
Fr. a berry or drupe: mostly woody plants, often spiny. 130. *Araliaceae*
Fr. a schizocarp of 2 dry seed-like carpels: herbs. ....131. *Umbelliferae*

(2) Metachlamydeae

1a. Corolla regular.
2a. Ovary superior.
3a. Fertile stamens more than 5.
4a. Stamens free, not borne in clusters: fr. basally attached.
5a. Styles 1: stamens mostly free from the corolla.
Capsule 3-celled .....133. *Clethraceae*
Capsule 5-celled.
Corolla cleft nearly or quite to the base: low half-shrubs, perennial herbs or fleshy saprophytes....134. *Pyrolaceae*
Corolla definitely gamopetalous: shrubs or trees ....135. *Ericaceae*
5b. Styles 2–8: stamens on the corolla: fr. a large fleshy berry with enlarged persistent calyx: shrubs or trees.....139. *Ebenaceae*
4b. Stamens borne in clusters, a cluster opposite each lobe of the corolla and attached to its base: fr. obliquely attached.....140. *Symplocaceae*
3b. Fertile stamens 2–5.
6a. Stamens opposite the lobes of the corolla.
Calyx herbaceous: styles 1.
Woody plants, rarely subherbaceous: fr. a drupe or berry. .....136. *Myrsinaceae*
Herbs: fr. a capsule.....137. *Primulaceae*
Calyx membranous, at least between the ribs: styles 5, sometimes united at the base: lvs. alternate. .....138. *Plumbaginaceae*
6b. Stamens alternate with the lobes of the corolla, or fewer.

7a. Plants woody.
8a. Stamens commonly 2: lvs. usually opposite. .....142. *Oleaceae*
8b. Stamens and corolla lobes 5 or 4.
9a. Gynoecium syncarpous; ovary compound.
10a. Corolla lobes and stamens 5: lvs. usually alternate.
11a. Stamens not inserted on the corolla.
Anthers opening by longitudinal slits: lvs. alternate. ..... 77. *Pittosporaceae*
Anthers opening by terminal pores. .....135. *Ericaceae*
11b. Stamens inserted on the corolla tube.
Trees: fls. white: fr. a black or yellow drupe... *Ehretia*
Rambling shrub: fls. purplish: fr. a red berry... *Lycium*
10b. Corolla lobes and stamens 4: lvs. opposite: shrubs.
Fr. a capsule with numerous very small seeds. 143. *Loganiaceae*
Fr. a berry or drupe.
Fr. a 2-seeded berry: lvs. evergreen, entire. .. *Gardneria*
Fr. a drupe, with 2–4 stones: lvs. deciduous, usually serrate. ..... *Callicarpa*
9b. Gynoecium apocarpous, of 2 distinct carpels: corolla twisted in the bud: lvs. opposite or whorled.....145. *Apocynaceae*
7b. Plants herbaceous.
12a. Corolla petaloid.
13a. Gynoecium apocarpous, of 2 carpels: lvs. usually opposite.
Filaments free..... *Catharanthus*
Filaments united: anthers joined to the stigma: pollen in waxy masses (pollinia).....146. *Asclepiadaceae*
13b. Gynoecium syncarpous.
14a. Ovary not deeply lobed.
15a. Twining vines.
Lvs. opposite: seeds many, winged. ..... *Crawfurdia*
Lvs. alternate: seeds few, mostly 4. .....147. *Convolvulaceae*
15b. Erect, decumbent or floating herbs, or if vines, not twining: seeds many.
Lvs. opposite or whorled.
Ovary 1-celled: capsule dehiscing by 2 valves.....144. *Gentianaceae*
Ovary 3-celled: capsule dehiscing by 3 valves.....148. *Polemoniaceae*
Lvs. alternate: ovary 2-celled, sometimes appearing 4-celled by a false partition: fr. a capsule or berry.....152. *Solanaceae*
14b. Ovary deeply 4-parted, separating at maturity into 4 nutlets: lvs. alternate.....149. *Boraginaceae*
12b. Corolla membranous (papery): fr. a circumscissile capsule: lvs. basal. .....161. *Plantaginaceae*
2b. Ovary inferior or semi-inferior. (2a, p. 8)
16a. Fls. not in heads subtended by involucres: anthers free.
17a. Herbs or shrubs, not tendril-bearing.
18a. Lvs. alternate (opposite or whorled below in some Campanulaceae).
19a. Plants woody, with watery sap.
Stamens of the same number and opposite the corolla lobes. ..... *Maesa*

Stamens alternate with the corolla lobes or more numerous.
Fr. fleshy, many-seeded: anthers prolonged in terminal tubes and opening at the apex..... *Vaccinium*
Fr. dry or drupaceous, few-seeded: anthers not prolonged, opening by slits.....141. *Styracaceae*

19b. Plants herbaceous: fr. a capsule: usually with milky juice. .....167. *Campanulaceae*

18b. Lvs. opposite or whorled.
Stipules present; lvs. often whorled. .....162. *Rubiaceae*
Stipules usually absent; lvs. never whorled.
Shrubs, parasitic on trees. ..... *Loranthus*
Shrubs or small trees, rarely herbs, not parasitic.....163. *Caprifoliaceae*

17b. Herbaceous vines, tendril-bearing: fr. a pepo: lvs. alternate.166. *Cucurbitaceae*

16b. Fls. in heads subtended by involucres: anthers united into a tube: fr. a cypsela (achene-like fr. from an inferior ovary).....169. *Compositae*

1b. Corolla irregular.

20a. Ovary superior.

21a. Stamens not borne on the corolla tube; anthers exserted: lvs. alternate: fr. a woody capsule..... *Rhododendron*

21b. Stamens borne on the corolla tube.

22a. Green color and normal lvs. lacking: herbaceous root-parasites. .....157. *Orobanchaceae*

22b. Green color present: plants not parasitic on roots.

23a. Plants aquatic, delicate or marsh herbs with dissected submersed lvs., regarded as carnivorous by means of small bladders on the lvs.: fr. a dehiscent capsule.155. *Lentibulariaceae*

23b. Plants terrestrial, with normal lvs.

24a. Lvs. alternate, or the lower opposite: fr. a 2-celled many-seeded capsule.....153. *Scrophulariaceae*

24b. Lvs. opposite, whorled or in a basal rosette.

25a. Seeds 4 or fewer to each ovary: stems often 4-angled.

26a. Ovary deeply 4-lobed, becoming 4 nutlets in fr.: fls. mostly in dense axillary fascicles: herbs. .....151. *Labiatae*

26b. Ovary not deeply lobed: infl. mostly terminal.
Fr. 2-4 seeded.
Shrubs or herbs with simple serrate, lobed or pinnatifid lvs.: fr. a berry, a drupe, or separating at maturity into 2-4 nutlets.....150. *Verbenaceae*
Herbs with simple entire lvs.: fr. a 2-4-seeded capsule. .....159. *Acanthaceae*
Fr. a 1-seeded nutlet (achene) enclosed by the persistent calyx: a perennial herb with simple coarsely-toothed lvs. .....160. *Phrymaceae*

25b. Seeds numerous.
Trees and woody vines: stamens 4, didynamous: fr. an elongated dehiscent capsule with numerous winged seeds. .....156. *Bignoniaceae*
Herbs or low shrubs.
Ovary 1-celled: fr. a linear-cylindric capsule: stemless herb or low shrub. .....158. *Gesneriaceae*
Ovary 2-4-celled: fr. an oblong capsule, 4-lobed

in cross-section, with many flat seeds: erect herbs with 4–angled stems.....154. *Pedaliaceae*

20b. Ovary inferior.

27a. Fls. not in heads subtended by involucres.

28a. Shrubs or woody vines (brs. sometimes herbaceous in *Sambucus*). .....163. *Caprifoliaceae*

28b. Herbs.

Stems weak: aquatic herb with solitary axillary fls. and indehiscent 1–seeded fr. bearing 3 recurved hooks at the top. ..... *Trapella*

Stems erect or decumbent: terrestrial plants with fls. in cymes, panicles or racemes.

Stamens 1–3: fr. 1–seeded: calyx very small in fr.: lvs. opposite: plants with watery sap. .....164. *Valerianaceae*

Stamens 5; the filaments sometimes united: fr. many-seeded: calyx often conspicuous in fr.: lvs. alternate: plants with milky juice. .....168. *Lobeliaceae*

27b. Fls. in heads subtended by involucres: fr. a cypsela.

Stamens 4, distinct: lvs. opposite, rarely whorled. .....165. *Dipsacaceae*

Stamens usually 5; the anthers united into a tube surrounding the style: lvs. mostly alternate, sometimes opposite or whorled. .....169. *Compositae*

b. MONOCOTYLEDONEAE

1a. Aquatic or marsh plants, often submersed or floating.

2a. Plants in the form of a floating thallus, oblong, ovoid or ellipsoid, without normal stems and lvs. .....182. *Lemnaceae*

2b. Plants with normal stems and usually with foliage lvs.

3a. Stems submersed or floating.

4a. Herbs with slender elongated stems.

5a. Lvs. alternate or rarely opposite.

Fls. clustered or in spikes.....172. *Potamogetonaceae*

Fls. solitary in axils of sheathing leaf-bases. .....173. *Najadaceae*

5b. Lvs. verticillate or in a basal rosette.

Lvs. verticillate. ..... *Hydrilla*

Lvs. in basal rosette..... *Eriocaulon*

4b. Herbs apparently stemless, or with creeping rootstocks.

Plants floating: leaves orbicular-cordate, spongy-reticulate. *Hydrocharis*

Plants submersed; the crown not floating.

Lvs. narrow, ribbon-like: perianth single. ..... *Vallisneria*

Lvs. with winged petioles; blades lanceolate, ovate or cordate, some of them floating: perianth double. .. *Ottelia*

3b. Stems mostly not submersed.

6a. Perianth lacking, or of bristles or scales, never petaloid.

7a. Fls. not in spikelets, though sometimes in heads.

8a. Infl. in dense cylindrical spikes: marsh plants of grass-like habit.

Spikes terminal, up to 30 cm. long and 3 cm. in diam.170. *Typhaceae*

Spikes lateral, on the sides of a leaf-like scape, 3–6 cm. long..... *Acorus*

8b. Infl. in heads, cymes or fascicles.

Fls. in globular or hemispherical heads.

Heads unisexual (monoecious), glabrous, without involucres. .....171. *Sparganiaceae*
Heads androgynous, pubescent, with involucres. ..183. *Eriocaulaceae*
Fls. in cymes or fascicles: rush-like or grass-like plants: fr. a capsule.....186. *Juncaceae*

7b. Fls. in spikelets: grass-like or rush-like plants.
Stems cylindrical, usually with hollow internodes: lvs. 2-ranked; the sheaths split: anthers versatile: fr. a caryopsis. .....178. *Gramineae*
Stems triangular (occasionally cylindric) and solid: lvs. 3-ranked; the sheaths closed: anthers basifixed: fr. an achene.....179. *Cyperaceae*

6b. Perianth present; at least the inner segments petaloid.
9a. Apocarpous; carpels several, distinct and separate from the beginning.
Fr. a cluster of achenes: lvs. basal and sheathing. ....175. *Alismaceae*
Fr. of several many-seeded follicles: fls. perfect: lvs. rush-like.....176. *Butomaceae*

9b. Syncarpous, at least when young.
Carpels 3–6, at first united into a superior ovary, becoming distinct at maturity: fls. perfect, in racemes or spikes: lvs. terete. .....174. *Juncaginaceae*
Carpels 1–3, not separating at maturity.
Ovary inferior: stamens all alike: fls. unisexual or polygamous: lvs. simple and entire. .....177. *Hydrocharitaceae*
Ovary superior: stamens often unequal, fls. perfect: lvs. petioled and with thick blades or long and grass-like. .....185. *Pontederiaceae*

1b. Terrestrial plants, often growing in moist places.

10a. Trees and shrubs.
Stems hollow, jointed: lvs. linear to oblong, not palm-like: fr. a caryopsis. ..... *Bambuseae*
Stems solid.
Trees with palm-like lvs.: fr. drupaceous. .....180. *Palmae*
Shrubs (often vines) with prickly stems: fr. a berry..... *Smilax*

10b. Herbs.
11a. Fls. in spikelets: grass-like plants with jointed stems.
Stems cylindrical, usually hollow: lvs. 2-ranked; the sheath split: anthers versatile: fr. a caryopsis. .....178. *Gramineae*
Stems mostly triangular and solid: lvs. 3-ranked; the sheaths closed: anthers basifixed: fr. an achene. .....179. *Cyperaceae*

11b. Fls. not in spikelets.
12a. Infl. a spadix, enclosed by a spathe. .....181. *Araceae*
12b. Infl. not a spadix.
13a. Perianth of green, brown or purplish scales: grass-like plants.....186. *Juncaceae*
13b. Perianth, or one series of the segments, petaloid, sometimes greenish.
14a. Ovary superior.
15a. Calyx and corolla clearly differentiated.
Lvs. alternate: seeds few. .....184. *Commelinaceae*
Lvs. verticillate: seeds several..... *Paris*

15b. Perianth segments all petaloid.

Segments in series of 4's: stems usually twining: seeds many. ....187. *Stemonaceae*
Segments in series of 3's: stems not twining: seeds several. ....188. *Liliaceae*

14b. Ovary inferior.
16a. Fr. a 3-winged capsule.
Twining vines: fls. unisexual: seeds few, winged. 190. *Dioscoreaceae*
Erect herbs: fls. bisexual: seeds many, very small. 195. *Burmanniaceae*
16b. Fr. not winged: stems not twining.
17a. Stamen, or stamens, not united with the pistil.
18a. Plants not tree-like, rarely over 1m. tall: perfect stamens 1, 3 or 6: fr. a capsule.
19a. Perfect stamens 3 or 6: fls. often more or less irregular.
20a. Stamens 6.
Fls. in a spike-like raceme terminating a long or short scape: with fascicled or fibrous roots.
Perianth cleft or divided: scape short (8–15 cm.).... *Ophiopogon*
Perianth lobed or shortly cleft: scape long (50–80 cm.). .... *Aletris*
Fls. single or in clusters, from a spathe-like bract: usually with bulbs. ....189. *Amaryllidaceae*
20b. Stamens 3, opposite the outer series of perianth segments: lvs. often equitant. ....191. *Iridaceae*
19b. Perfect stamen 1: staminodes 1 or more, at least some of them petaloid: fls. very irregular.
Anthers 2-celled: calyx tubular or spathe-like: plants usually aromatic: seeds small and numerous. ....193. *Zingiberaceae*
Anthers 1-celled: sepals free: seeds few, globose, hard and black. ....194. *Cannaceae*
18b. Plants tree-like, herbs 1–6 m. tall: lf. bases clasping and over-lapping to form a false stem; the blades 0.5–2 m. long: fls. very irregular: perfect stamens 5: fr. an oblong leathery-skinned berry, 10–20 cm. long. ....192. *Musaceae*
17b. Stamen, or stamens, united with the pistil to form a definite gynandrium: anthers 2-celled: pollen usually borne in agglutinated masses (pollinia). 196. *Orchidaceae*

I. PTERIDOPHYTA Ferns and Fern Allies
羊齒植物門 (Yang Ch'ih Chih Wu Mên)

Vascular plants bearing asexual spores on the leaves, in the axils of leaves, in strobili, or in sporocarps.

Treatment of *Pteridophyta* contributed by Charles E. DeVol.

1. EQUISETACEAE Horsetail or Scouring Rush Family 木賊科 (Mu Tse K'o)

Rush-like perennial *plants* from underground rhizomes; *aerial stems jointed and hollow*, simple or branched, grooved; surfaces of the stems overlaid with silica in the form of dots, cross-bands, rosettes or a smooth covering; the internodes usually having a large central cavity (centrum), a smaller cavity under each groove (vallecular), and a very small cavity under each ridge (carinal): stomata in broad bands or regular rows in the grooves: *leaves scale-like, at the nodes*, very small, *united to form a sheath*: branches, when present, one or two at each node, or in whorls: *strobilus terminal*: sporangia borne on peltate sporangiophores: spores of one kind, each with four elaters. One genus.

1. **Equisetum** Linn. 木賊屬 (Mu Tse Shu; Wood Thief Genus)

Characters of the family. 23 species. (Latin: *equus*, horse; *seta*, bristle.)

Key to the Species

Sterile stems with 6–12 branches at each node; fertile stems unbranched, without chlorophyll..... 1. *E. arvense*
Fertile and sterile stems alike, unbranched or with 1–4 branches at some of the nodes..... 2. *E. ramosissimum*

1. **Equisetum arvense** Linn. Field Horsetail 筆管草 (Pi Kuan Ts'ao) (Fa. B. 9:132) Sterile stem 10–45 cm. high; fr. early spring; centrum 1/3 diam. Temperate and arctic Eurasia and North America; locally in An., Hun., Ku. Roadsides.
2. **Equisetum ramosissimum** Desf. Branched Horsetail 節節草 (Chieh Chieh Ts'ao. (Fa. B. 9:129) Sterile stem 20–80 cm. high; fr. VIII–X; centrum 1/2 to 4/5 of diam) Asia, Africa, Europe; locally in An., Che., Hun., Ki., Ku. Roadsides, dikes. Fig. 1.

2. LYCOPODIACEAE Club-Moss Family 石松科 (Shih Sung K'o)

Spores of one kind, borne in large reniform or nearly round sporangia; walls of the sporangia 2 or 3 layers of cells thick. Two genera with about 700 species, one (Phylloglossum) monotypic; one genus in China.

1. **Lycopodium** Linn. 石松屬 (Shih Sung Shu)

Low, evergreen, trailing or erect plants of woodlands and barren fields: *lvs. uniform*, small, lanceolate, crowded on the brg. stems: sporangia large, reniform, in axils of ordinary lvs., or subspherical and in terminal strobili: *spores of one kind.* About 700 species. (Greek: *lycas*, wolf, and *pous*, foot; perhaps referring to the branching rhizomes of some species.)

Key to the Species

Sporangia in strobili.
Strobili sessile, less than 1 cm. long..... 1. *L. cernuum*

Strobili 4–5 cm. long, on peduncles 8–20 cm. long ..... 2. *L. clavatum*
Sporangia reniform, in axils of ordinary lvs .... 3. *L. serratum*

1. **Lycopodium cernuum** Linn. Staghorn Club-Moss 過山龍 (Ko Shan Lung; the dragon goes over the mountain, the rhizomes creep over the rocks) (Mak. F. 972) Stems 20–40 cm. long; fr. V–XI; lvs. subulate. China, Japan, New Zealand, North and South America; locally in An., Ki. Wooded hillsides. Fig. 2.
2. **Lycopodium clavatum** Linn. Common Club-Moss 石松 (Shih Sung; Stone Pine) (G. M. 14) Stems 10–45 cm. long; fr. VI–VIII; lvs. linear, with bristle-tips. America, Asia, Europe, Australia; locally in An., Che., Ki. Moist woods.
3. **Lycopodium serratum** Thunb. 千層塔 (Ch'ien Ts'êng T'a; Thousand-story pagoda) (Mak. F. 971) Stems 8–15 cm. high; fr. IV–X; stem erect. Siberia, China, Japan, Polynesia; locally in An., Che., Ki., Ku. Damp woods, crevices of rocks.

3. SELAGINELLACEAE Spike-Moss Family 卷柏科 (Chüan Pai K'o)

Small creeping moss-like plants, or suberect to erect larger plants: *lvs. usually dimorphic*: sporangia in axils of lvs. (sporophylls), these often in a strobilus, uniform or dimorphic: *spores of two kinds.* One genus.

1. Selaginella Linn. 卷柏属 (Chüan Pai Shu; Curly Arborvitae Genus)

Characters of the family. 500 species. (From *Selago*, an ancient name for *Lycopodium*.)

Key to the Species

a. Stems densely tufted, rosulate, curling up when dry ..... 1. *S. tamariscina*
aa. Stems creeping or erect.
  b. Main stem erect, rooting only at base.
    c. Stems pubescent.
      With auricles on under-side of lateral lvs. ..... 2. *S. trichoclada*
      Without auricles on the under-side of lateral lvs. ..... 3. *S. braunii*
    cc. Stems glabrous.
      d. Lvs. near base of stem equilateral, directed upwards.
        Lvs. near base of stem distant ..... 4. *S. moellendorffii*
        Lvs. near base of stem overlapping ..... 5. *S. caulescens*
      dd. Lvs. near base of stem inequilateral, directed outwards.
        Sporophylls dimorphic, similar to lvs. ..... 6. *S. labordei*
        Sporophylls uniform, different from lvs. ..... 7. *S. delicatula*
  bb. Main stem creeping, rooting at intervals; fruiting stems suberect.
    e. Lvs. uniform, oval; margins ciliate, xerophytic ..... 8. *S. sinensis*
    ee. Lvs. dimorphic; terrestrial.
      f. Sporophylls dimorphic.
        Sporophylls in lax strobili ..... 9. *S. nipponica*
        Sporophylls in compact strobili ..... 10. *S. heterostachys*
      ff. Sporophylls uniform.
        Lvs. with entire margins: strobili terminal ..... 11. *S. uncinata*
        Lvs. with ciliate margins: strobili near base of lateral branches ..... 12. *S. remotifolia*

1. **Selaginella tamariscina** (Beauv.) Spring (DeV. F. 38) Branches 4–10 cm. long; fr. IX–XI; lateral and medial lvs. alike, bristle-tipped. Asia; locally in An., Ki, Ku. Exposed rocks.

2. **Selaginella trichoclada** Alston (J. B. 70:63) Stems 70 cm. tall; fr. IV–XI. China; locally in An. Moist woods, cliffs.
3. **Selaginella braunii** Baker (Fa. B. 5:281) Stems 15–35 cm. tall; fr. X. China; locally in Che. Moist woods, cliffs.
4. **Selaginella moellendorffii** Hieron. (DeV. F. 39) Stems 15–30 cm. tall; fr. VIII–XI; lateral lvs. finely serrulate. East Asia; locally in An., Che., Ki., Ku. Moist hillsides. Fig. 3.
5. **Selaginella caulescens** (Wall.) Spring 兗州卷柏 (Yen Chou Chuan Pê; Yenchou Spike Moss; Yenchou is a district in Shantung) (DeV. F. 39) Stems 15–30 cm. tall; fr. VIII; lateral lvs. entire, except at base. Asia; locally in Che., Ki. Along mountain streams.
6. **Selaginella labordei** Hieron. (DeV. F. 40) Stems 12–25 cm. tall; fr. VII–X; lvs. with white serrulate margins. China; locally in Ki. Wooded hillsides.
7. **Selaginella delicatula** (Desv.) Alston Feathery Spike-Moss (DeV. F. 39) Stems 20–45 cm. tall; fr. VII–XI; lvs. entire. Asia; locally in An., Che. Moist woods.
8. **Selaginella sinensis** (Desv.) Spring (DeV. F. 41) Stems 10–30 cm. long; fr. VIII–IX. China, Manchuria; locally in An. Exposed rocks. Fig. 4.
9. **Selaginella nipponica** Fr. & Sav. (Fa. B. 5:272) Stems 4–8 cm. long; fr. IV–VII; lateral lvs. ovate, media lanceolate. China, Japan; locally in An., Che., Ki., Ku. By ditches, roadsides, hillsides.
10. **Selaginella heterostachys** Baker (DeV. F. 40) Stems 10–12 cm. long; fr. V–VIII; lvs. as in *S. nipponica*. East Asia; locally in An., Che., Ki. Moist hillsides.
11. **Selaginella uncinata** (Desv.) Spring 翠雲草 (Ts'ui Yün Ts'ao; Blue Cloud Grass; many of the leaves are bluish green. The character "Ts'ui" refers to the blue of the Chinese Kingfisher) (B. M. 96) Stems 15–45 cm. long; fr. VIII–X; lateral brs. 3–8 cm. apart. China; locally in An. Stream banks, woods.
12. **Selaginella remotifolia** Spring (*S. kraussiana* Arnott., non A. Br.) Common Spike-Moss (B. M. 1st. 74; Fa. B. 5:274) Stems 5–20 cm. long; fr. VI–VII; strobili borne along main stem. Asia and East Indies; locally in Ku. Cultivated.

4. ISOETACEAE Quillwort Family 水韭科 (Shui Chiu K'o)

Aquatic or marsh plants rooting in the mud, with a cluster of *awl-shaped lvs.* arising *from a* 2–4–lobed *corm, each leaf* being a potential sporophyll *bearing a sporangium on its* inner flattened *basal portion*, megasporangia and microsporangia in definite zones: sporangia 4–7 mm. long, oblong, deeply sunken in leaf tissue, the upper end and sides of the sporangium often covered by a "velum" or flap: a triangular ligule borne above the sporangium. One genus.

1. Isoetes Linn. 水韭屬 (Shui Chiu Shu; Water Leek Genus)

Characters of the family. 80 species. (Greek name used by Pliny, presumably for a house leek.)

1. **Isoetes sinensis** Palmer (A. F. J. 1927:3) Lvs. 15–25 cm. long; VI–X; corm 3–lobed; velum absent. China, Japan; locally in Ku. On bottom of ponds.

5. MARSILEACEAE 蘋科 (P'in K'o)

Small subaquatic ferns, rooting in mud: *rhizome creeping*, hairy: leaves linear, or with 2 or 4 leaflets: sporangia borne in *sporocarps* on the stipes or *at* their *bases*: each sorus bearing both megasporangia and microsporangia. 3 genera.

1. **Marsilea** Linn. Pepperwort 蘋属 (P'in Shu)

Plants growing in shallow water at least part of the year, with creeping rhizomes rooting in mud, and lvs. commonly floating on the surface: *lvs.* slender-petioled, *quadrifoliolate*: sporocarps borne on short peduncles arising on or near the base of the stipes, ovoid, solitary to several: two rows of sori borne on a gelatinous ring filling the sporocarp, each sorus bearing a row of megasporangia and many microsporangia. 67 species. (Named for Luigi Fernando Conte Marsigli, 1658–1730, an early Italian naturalist.)

1. **Marsilea quadrifolia** Linn. (G. M. 51) Petiole 6–10 cm. long or more; VIII–XI; sporocarps pubescent. North America, Europe, Asia; locally in An., Che., Ki., Ku. Edge of ponds.

6. **SALVINIACEAE** 槐葉萍科 (Huai Yeh P'ing K'o)

Small *floating plants*: rhizome horizontal, branching freely: *sporangia* of two kinds, *borne in sporocarps*. Two genera, often considered as representing two separate families.

Key to the Genera

Lvs. 1–2 cm. long, bright green; midrib distinct ..... 1. *Salvinia*
Lvs. about 1 mm. long, reddish ..... 2. *Azolla*

1. **Salvinia** (Michx.) Adans. 槐葉萍属 (Huai Yeh P'ing Shu; Locust-leaf Duck-weed Genus)

Small floating plants with slender rhizomes which are easily broken, thus rapidly reproducing vegetatively, and often covering whole ponds: *true roots absent*; *lvs.* apparently 2-ranked, floating, *a third series root-like and submersed*: sporocarps globose, arranged in clusters arising from the basal divisions of the filiform leaves, some containing microsporangia, others megasporangia. 8 species. (Named for Antonio Maria Salvini, 1633–1729, professor of botany in Florence, Italy.)

1. **Salvinia natans** (L.) All. (G. M. 51) Lvs. 10–15 mm. long; fr. VII–XII; papillae with tufts of free hairs. Europe, Asia, North America; locally in An., Che., Ki., Ku. Floating on ponds.

2. **Azolla** Lam. Water-Velvet 滿江紅属 (Man Chiang Hung Shu; Whole River Red Genus)

Small floating ferns turning purplish in the fall: lvs. alternate, 2-lobed, the upper lobe floating, the lower lobe submersed: *roots single or clustered*: sporocarps of two kinds; the microsporocarp larger, globose, containing many stalked microsporangia each of which contains 2–8 massulae, the microspores imbedded in the massulae, the massulae bearing trichomes; megaspore ovoid, containing a bell-shaped basal portion and 3 apical floats. 7 species. (Greek term meaning "to destroy by drying," in reference to the aquatic habit.)

1. **Azolla imbricata** (Roxb.) Nakai (DeV. F. 44) Lvs. 1.2–1.4 mm. long; fr. IX–XI; 3–5 trichomes on one side of massula, and 2 tiers of floats. Asia; locally in An., Che., Ki., Ku. Floating on ponds.

7. **OPHIOGLOSSACEAE** Adder's Tongue Family 瓶爾小草科 (P'ing Êrh Hsia Ts'ao K'o)

Succulent herbs; two epiphytic, the others terrestrial; stem short, fleshy: leaves

consisting of a fertile segment branching from the sterile segment: *sporangia borne on the simple or pinnately branched fertile segment*: sterile blade simple or compound. 4 genera; 2 in China.

Key to the Genera

Sporangia in a simple spike: sterile blade simple; veins reticulate ..... 1. *Ophioglossum*
Sporangia in a compound spike: sterile blade pinnate to decompound; veins free ..... 2. *Botrychium*

1. **Ophioglossum** Linn. Adder's Tongue 瓶爾小草属 (P'ing Êrh Hsiao Ts'ao Shu; Little Bottle-like Grass Genus)

Roots fibrous, fleshy: bud borne on apex of rhizome, exposed and free from leaf: leaves dividing into sterile and fertile segments from a short common stalk; *sterile blade simple*, entire; veins reticulate; the fertile segment simple; sporangia coherent to stalk, opening by a transverse slit. 27 species. (Greek: *ophis*, a serpent, and *glossa*, tongue; referring to the narrow sporophyll.)

1. **Ophioglossum angustatum** Maxon (PBSW 36:169–178) Common stalk 2–8 cm.; fr. IV–VI; sterile blade narrow. China, Japan; locally in An., Ku. Damp grasslands.

2. **Botrychium** Sw. Grape Fern 陰地蕨属 (Yin Ti Chüeh Shu; Shady Soil Fern Genus)

Rhizome short, with clustered, fleshy roots: bud enclosed within base of leaf stalk: leaves fleshy, with a common short stalk dividing into sterile and fertile portions; *sterile blades pinnate to decompound*; venation dichotomous, free; fertile segment long-stalked, 1–4-pinnately branched: sporangia 2-ranked, nearly sessile. 23 species. (Name a diminutive of the Greek: *botrys*, cluster of grapes; referring to arrangement of sporangia.)

Key to the Species

Sterile portion of leaf 15–18 cm. broad, tripinnatifid in lowermost section; ultimate segments long, lanceolate; margins serrate ..... 1. *B. japonicum*
Sterile portion of leaf 6–12 cm. broad, 4-pinnatifid in lowermost section; ultimate segments small, oval ..... 2. *B. ternatum*

1. **Botrychium japonicum** (Prantl) Underw. (Mak. F. 967). Stalk of fertile leaf 14–35 cm. long; fr. VIII–XI; petiole hairy. Japan, China; locally in Ki., Ku. Moist woods.
2. **Botrychium ternatum** (Thunb.) Sw. Moonwort (Mak. F. 966). Stalk of fertile leaf 15–22 cm. long; fr. VIII–XI; petiole glabrous. Asia; locally in An., Ki., Ku. Moist woods.

8. **OSMUNDACEAE** 紫蕨科 (Tzŭ Chüeh K'o)

Large terrestrial ferns with horizontal rhizomes: leaves erect, pinnately compound; veins free: sporangia large, not in definite sori, maturing simultaneously; exindusiate; annulus of a few thickened cells at the apex of sporangia. 3 genera.

1. **Osmunda** Linn. Flowering Fern 紫纂属 (Tzŭ Ts'uan Shu; Purple Design Genus)

Tall ferns growing in swamps or moist woods: leaves in large tufts, long-stalked, bipinnatifid to bipinnate; veins forking, free; *fertile leaves or fertile portions of leaves*,

much contracted, with hardly any chlorophyll-bearing tissue: sporangia globose, opening by a longitudinal cleft into two valves; annulus a cluster of apical cells. 13 species (Named for *Osmunder*, a Saxon name for the Celtic god, Thor.)

Key to the Species

Sterile leaves deeply bipinnatifid; fertile and sterile leaves distinct ... 1. *O. cinnamomea*
Sterile leaves bipinnate; pinnules large, oblong or lanceolate.
Fertile and sterile leaves distinct ..... 2. *O. japonica*
Fertile pinnae at apex of sterile leaf..... 3. *O. regalis*

1. **Osmunda cinnamomea** Linn. var. **asiatica** Fernald Asiatic Cinnamon Fern (Mak. F. 965). Sterile leaves 6–10 dm. tall; fr. V–VI; stipes with reddish tomentum. Siberia, China, Japan; locally in Ki. Marsh land.
2. **Osmunda japonica** Thunb. 薇 (Wei) (Mak. F. 964). Sterile leaves 6–10 dm. tall; fr. IV–X; fertile leaves distinct. China, Japan; locally in An., Che., Ki., Ku. Hillsides, streambanks.
3. **Osmunda regalis** Linn. Royal Fern (G. M. 46). Sterile leaves to 1.6 m. tall; fr. VII–VIII; fertile pinnae at apex of leaf. Europe, North America, Asia; locally in Ki. Hillsides.

9. SCHIZAEACEAE Climbing Fern Family 海金沙科 (Hai Chin Sha K'o)

Terrestrial ferns, ours with *twining rachis*, differing widely in form of leaves and habit of growth: sporangia solitary, borne in two rows, sessile or subsessile, marginal or near margin; annulus apical, complete. 4 genera.

1. Lygodium Sw. Climbing Fern 海金沙属 (Hai Chin Sha Shu; Golden Ocean Sand Genus)

Twining vine-like ferns; rhizome hairy: rachis long, twining: lvs. palmately or pinnately lobed; sporangia in two rows borne on contracted ultimate divisions of the leaf and covered by imbricating scale-like indusia. 39 species. (Greek: *lygodes*, flexible; these ferns have vine-like lvs.)

1. **Lygodium japonicum** (Thunb.) Sw. Japanese Climbing Fern (DeV.F. 48). Twining rachises 1–3 m. long; fr. VI–XI; fertile and sterile pinnae dimorphous. Asia, Australia; locally in An., Che., Ki., Ku. Hillsides. Fig. 5.

10. GLEICHENIACEAE 裏白科 (LiPai K'o)

Terrestrial ferns with long creeping rhizomes: leaves pinnate or pseudodichotomously compound; veins free: *sori* dorsal, *exindusiate*: sporangia subsessile, few in each sorus: annulus transverse, complete. Often considered as having only one genus; Copeland recognizes 6; Ching recognizes 5.

Key to the Genera

Leaves pinnate above highest fork, with stipule-like pinnae at the forkings: rhizome pubescent ..... 1. *Dicranopteris*
Leaves bipinnate above the highest fork, without stipule-like segments at the forkings; rhizome scaly ..... 2. *Hicriopteris*

1. Dicranopteris Bernh. 梳齒蕨属 (Shu Ch'ih Chüeh Shu)

Rhizome slender, widely creeping, *clothed with* long multicellular reddish brown *hairs*: leaves uniseriate: stipe slender; rachises of different orders repeatedly pseudo-

dichotomously forked, with stipule-like segments at the forkings: axillary bud small, densely hairy: *lamina* of indefinite growth, *pinnate above the highest fork*; segments pectinate: veins 3–6–forked in each group: sori exindusiate, consisting of 6–12 subsessile sporangia. 10 species.

1. **Dicranopteris linearis** (Burm.) Underw. (*Gleichenia linearis* (Burm.) Clarke) (Bd. F. 4). 25–100 cm. tall; fr. IV–X; segments 2–4 cm. long. Asia to Polynesia and New Zealand; locally in An., Che., Ki., Ku. Exposed hillsides.

2. **Hicriopteris** Presl 裏白属 (Li Pai Shu; Under-side White Genus)

Rhizome often one cm. or more thick, widely creeping, *clothed with* reddish brown ovate or lanceolate *scales*: leaves distant; stipe often several feet long and up to one cm. thick: aborted central leaf-bud between pinnae large, scaly, with a pair of bracts: *lamina* of definite growth, *bipinnate above the highest fork*; veins once forked: sori exindusiate, usually consisting of 3–4 subsessile sporangia. 20 species.

Key to the Species

Ultimate segments pointed, separate, oblique to rachis	1. *H. laevissima*
Ultimate segments obtuse, approximate, at right angles to rachis	2. *H. glauca*

1. **Hicriopteris laevissima** (Christ) Ching (*Gleichenia laevissima* Christ) (Ching 4:152). Stipes 3–5 dm. high; fr. V–VIII; pinnae 3–4 dm. long. China, Japan, Philippines; locally in Ki. Mountain ravines.
2. **Hicriopteris glauca** (Thunb.) Ching (*Gleichenia glauca* (Thunb.) Hook.) (Bd. F. 2). 1 m. tall; fr. IV–IX; pinnae 4–6 dm. long. East Asia; locally in Che., Ki. Mountain ravines.

11. **HYMENOPHYLLACEAE** Filmy Fern Family 膜蕨科 (Mo Chüeh K'o)

Usually small epiphytic or terrestrial ferns: leaves one cell thick in nearly all species: sori marginal: sporangia borne on a long bristle-like receptacle, or on a broad compact receptacle which is the elongation of a vein: indusium tubular or bilabiate: annulus complete. The family has usually been considered as consisting of the two genera, *Trichomanes* and *Hymenophyllum*, with a total of 650 species; Copeland now recognizes 34 genera.

Key to the Genera

a.	Indusium bilabiate.	
	Margin of leaves spinulose-dentate	1. *Hymenophyllum*
	Margin of leaves entire	2. *Mecodium*
aa.	Indusium tubular.	
	Leaves minute, reniform to orbicular	3. *Gonocormus*
	Leaves pinnate in plan.	
	False veinlets present	4. *Crepidomanes*
	False veinlets absent	5. *Vandenboschia*

1. **Hymenophyllum** Sw. 膜蕨属 (Mo Chüeh Shu; Membrane Ferns Genus)

Epiphytic or petrophilous ferns: rhizome filiform, widely creeping: leaves small to medium sized, pinnately decompound; *margins spinulosedentate*: indusium bilabiate: receptacle included or nearly so. 25 species, nearly all from the temperate regions. (Greek name for membrane fern.)

1. **Hymenophyllum barbatum** Baker (H.S.F. 68). Lamina 2–3 cm. long; fr. VII–VIII;

tripinnatifid. China, Japan, Korea, Formosa; locally in Ki. On damp rocks.

2. **Mecodium** Presl 美膜蕨属 (Mei Mo Chüeh Shu; Beautiful Membrane Ferns Genus)

Epiphytic or petrophilous ferns: rhizomes filiform, widely creeping: leaves small to medium sized, pinnately compound; *margins entire*: indusium bilabiate; receptacle included. 100 species, mostly tropical.

Key to the Species

Lamina tripinnate to decompound	1.	*M. polyanthos*
Lamina bipinnate	2.	*M. wrightii*

1. **Mecodium polyanthos** (Sw.) Copel. (*Hymenophyllum polyanthos* Sw.) (DeV. F. 46). Lamina 3–8 cm. long; fr. VII–VIII; lower pinnae shortened, stipe slender, often long. Cosmopolitan with many forms; locally in Ki. On damp rocks in gorges.
2. **Mecodium wrightii** (v.d.B.) Copel. (*Hymenophyllum wrightii* v.d.B.) (DeV. F. 46). Lamina 2–2.5 cm. long; fr. VII–VIII; stipe very short. China, Japan; locally in Ki. On damp rocks in gorges.

3. **Gonocormus** v.d.B. 微膜蕨属 (Wei Mo Chüeh Shu; Tiny Membrane Fern Genus)

Minute epiphytic or petrophilous ferns: rhizome and stipe barely distinguishable; both bear buds and branches freely; rhizome and base of stipe covered with reddish brown hairs: *lamina minute, reniform to orbicular*, usually palmately lobed; margins deeply cleft, crenate or incised; veins flabellate: indusium tubular, conspicuously dilated, sunken into the leaves: receptacle exserted when mature. 3 species.

1. **Gonocormus minutus** (Bl.) v.d.B. (*Trichomanes parvulum* Hook., not Poir.) (Bd. F. 39; Ph. J. 67:56–57). Lamina 1 cm. in diam.; fr. VII–VIII; lamina reniform to orbicular; margins deeply cleft. Siberia, China, Japan; locally in An., Ki. Damp rocks in mountain gorge. Fig. 6.

4. **Crepidomanes** Presl 偽脈蕨属 (Wei Mê Chüeh Shu; False Vein Fern Genus)

Epiphytic or petrophilous ferns: rhizome filiform, widely creeping: leaves small to medium sized, *pinnately* compound; margins entire, often undulate, *with false submarginal veinlets*: indusium tubular, obconical: receptacle exserted. 12 species.

1. **Crepidomanes latealatum** (v.d.B.) Copel. (DeV. F. 47). Lamina 3–5 cm. long; fr. VII–VIII; rachis and stipe winged. China, Indo-China, India; locally in Ki. On damp rocks along mountain streams.

5. **Vandenboschia** Copel. 石衣蕨属 (Shih I Chüeh Shu; Rock-clothed Fern Genus)

Epiphytic or petrophilous ferns: rhizome stout, 1–3 mm. thick, usually scaly, widely creeping, often scandent: leaves distant, medium to large size, *pinnate* or pinnately compound: indusium tubular: receptacle exserted. 24 species.

Key to the Species

Lamina pinnate	1.	*V. auriculata*
Lamina tripinnatifid	2.	*V. orientale*

1. **Vandenboschia auriculata** (Bl.) Copel. (*Trichomanes auriuclatum* Bl.) (H.S.F. 82).

Lamina 10–25 cm. long; fr. VII–VIII; pinnae unequal at base, margins cleft. Asia and East Indies; locally in Ki. On damp rocks along mountain streams.

2. **Vandenboschia radicans** (Sw.) Copel. (*Trichomanes radicans* Sw.) (Ph. J. 67:54). Stalk 5–15 cm. long, lamina up to 30 cm. long; fr. VII–VIII; exceedingly variable. Cosmopolitan; locally in Ki. On damp rocks in mountain streams.

12. **CERATOPTERIDACEAE** Maxon 水蕨科 (Shui Chüeh K'o)

Aquatic ferns of three types, some species *floating* on the water, some *rooting in the mud* and growing completely submersed except perhaps for the tips of fertile lvs., and others rooting in the mud and growing emersed as bog plants: apparently stemless, the fibrous roots arising from the base of the stipes: lvs. dimorphic; fertile lvs. erect, contracted, taller; sterile lvs. pinnate, pinnately compound, or simple: sporangia sessile, globose; annulus variable; *indusia formed by the reflexed leaf margins*; surface of spores marked by a series of ridges. One genus.

1. **Ceratopteris** Brongn. Water Fern 水蕨属 (Shui Chüeh Shu; Water Fern Genus)

The characters are those of the family. Probably 8 species, 2 in China. (Greek: *cerato*, horn, and *pteris*, fern; the fertile lvs. resemble deer antlers.)

1. **Ceratopteris thalictroides** (L.) Brongn. (Bd. F. 123). Sterile and fertile leaves both growing at same time; fr. IX–X; fertile leaves 20–60 cm. Temperate and sub-tropical regions; locally in An., Che. Submersed in shallow water.

A related form, which may prove to be a distinct species, occurs in China and Indo-China (locally in Kiangsu), floating on shallow water in marshes. It is distinguished from *C. thalictroides* by its floating rather than submersed habit, and also by its short stipes and simple leaves.

13. **PLAGIOGYRIACEAE** Bower 瘤足蕨科 (Liu Tsu Chüeh K'o)

Terrestrial ferns: stipes clustered; base enlarged, bearing spongy glands: leaves dimorphous, both kinds *pinnate*; veins free, simple or forked: sori often covering the contracted fertile leaves: sporangium with an oblique continuous annulus: unaltered reflexed margin serving at first as a false indusium: *rhizome and stipe without scales.* One genus.

1. **Plagiogyria** (Kunze) Mett. 瘤足蕨属 (Liu Tsu Chüeh Shu; Tumor-footed Fern Genus)

The characters are those of the family. 31 species.

Key to the Species

Apex pinnatifid, with about 30 pairs of lateral pinnae ..... 1. *P. hayatana*
Apex with terminal pinna and 10–15 pairs of lateral pinnae.
  Terminal pinna confluent; lateral pinnae mostly adnate ..... 2. *P. japonica*
  Terminal pinna free; lateral ones mostly free ..... 3. *P. euphlebia*

1. **Plagiogyria hayatana** Makino (Ph. J. 38:401). Sterile leaves 40–85 cm. tall; fr. VII–VIII; lateral pinnae adnate; lower ones deflexed, shorter. China, Formosa; locally in An. Wooded hillsides.
2. **Plagiogyria japonica** Nakai (DeV. F. 56). Sterile leaves 45–55 cm. tall; fr. VII–X; sterile pinnae 5–8 cm. long. China, Japan, Korea; locally in An., Ki. By mountain streams. Fig. 7.

3. **Plagiogyria euphlebia** (Kunze) Mett. (Bd. F. 129). Sterile leaves 45–90 cm. tall; fr. VII–IX; sterile pinnae 15–20 cm. long. China, Japan, India; locally in Ki. By mountain streams.

14. **ONOCLEACEAE** Ching 長角蕨科 (Chang Chio Chüeh K'o)

Terrestrial ferns: *rhizomes* short, thick, *scaly*: *leaves* dimorphic, stipitate, pinnate or *bipinnatifid*; fertile leaves brown to purplish, with strongly contracted coriaceous revolute margins: sporangia protected by a thin inner indusium. 2 genera.

1. **Matteuccia** Todaro Ostrich Fern 長角蕨属 (Chang Chio Chüeh Shu; Long-horn Fern Genus)

Large terrestrial ferns with clustered dimorphous leaves: fertile leaves erect, rigid; pinnae contracted, purplish brown; margins reflexed, concealing the sori, torn when mature; sterile leaves bipinnatifid, texture thin; stipes with large brown scales at the base; under surface of the lamina and rachis sparsely covered with small scales. 4 species. (Named for Carlo Matteucci, an Italian physicist.)

1. **Matteuccia orientalis** (Hook.) Trev. (*Struthiopteris orientalis* (Hook.) Bedd.) Oriental Ostrich Fern (Bd. F. 20). 75–100 cm. tall; fr. VII–IX; fertile pinnae 6–12 cm. long. China, Japan, Himalaya; locally in An., Ki. Wooded hillsides. Figs. 8 and 9.

15. **DENNSTAEDTIACEAE** Ching 袋胞蕨科 (Tai Pao Chüeh K'o)

Terrestrial ferns: *rhizomes* creeping, *hairy*; scales very narrow, if present: leaves pinnate to tripinnate, usually pubescent, the hairs septate; veins free: sori marginal or submarginal, borne on ends of veins; indusium cup-shaped. 7 genera.

Key to the Genera

Ultimate pinnules cuneate	3. *Sphenomeris*
Ultimate pinnules not cuneate.	
Sori marginal: lower pinnae much the largest	1. *Dennstaedtia*
Sori submarginal: lower pinnae often shortened, never decidedly longer	2. *Microlepia*

1. **Dennstaedtia** Bernh. 袋胞蕨属 (Tai Pao Chüeh Shu; Pocket Indusiate Fern Genus)

Medium sized terrestrial ferns: rhizomes widely creeping, densely covered with multicellular hairs: leaves bipinnate to decompound; *lower pinnae longest*: *sori marginal* on apex of a free veinlet; indusium cup-shaped, united with the marginal sinus. 70 species. (Named for August Wilhelm Dennstaedt, a German botanist who wrote on the flora of Weimar about 1800.)

1. **Dennstaedtia scabra** Wall. (Bd. F. 24). 40–65 cm. tall; fr. VII–IX; lower pinnae 10–18 cm. long. China, Japan, Malaya; locally in Ki. Wooded hillsides. Fig. 10.

2. **Microlepia** Presl 細鱗胞蕨属 (Hsi Lin Pao Chüeh Shu; Thin-scaled Indusiate Fern Genus)

Medium sized ferns, usually densely covered with straight multicellular hairs: rhizomes creeping, hairy: leaves pinnate to tripinnatifid; *lowermost pinnae often shortened*; pinnae and pinnules often unequal-sided, the adaxial side larger; veins free, simple or forked: *sori* borne at the end of a vein, *submarginal*; indusium half cup-shaped, usually with a more or less cuneate hairy base, attached at base and sides. 45 species. (Greek: *micro*, small, and *lepis*, scale; referring to the indusia.)

Key to the Species

a.	Leaves glabrous, bipinnate to pinnatifid; pinnae deltoid.....	1. *M. wilfordii*
aa.	Leaves, stipe and rachis pubescent.	
	Leaf narrowly lanceolate, 2–4 cm. broad.....	2. *M. pilosella*
	Leaf broadly lanceolate, 10–60 cm. broad.	
	Lamina pinnate to bipinnatifid	3. *M. marginata*
	Lamina bipinnate to tripinnatifid	4. *M. strigosa*

1. **Microlepia wilfordii** Moore (*Davallia wilfordii* Bak.) (H.S.F. 98). 25–65 cm. tall; fr. VII–X. China, Japan, Korea; locally in Ki. Crevices of rocks and walls.
2. **Microlepia pilosella** (Hook.) Moore (*Davallia hirsuta* Sw.) (H. S. F. 98; C. Chr. 210). 15–25 cm. tall; fr. IV–XI; pinnate-bipinnatifid. China, Japan, Korea, Manchuria; locally in An., Ki., Ku. Walls, rocks and ledges.
3. **Microlepia marginata** (Houtt.) C. Chr. (Bd. F. 64). 45–100 cm. tall; fr. V–XI; margins serrate to deeply lobed. China, Japan, India, Ceylon; locally in An., Ki., Ku. Wooded hillsides. Fig. 11.
4. **Microlepia strigosa** (Thunb.) Presl Hairy Cup Fern (Bd. F. 67). 40–80 cm. tall; fr. VII–XI; pinnae 12–15 cm. long, 2 cm. broad. China, Japan, Polynesia, India; locally in Che., Ku. Cultivated or on hillsides.

3. **Sphenomeris** Maxon Rock Fern 烏韭屬 (Wu Chiu Shu; Black Leek Genus)

Terrestrial ferns with short rhizomes: scales on rhizome fibrillose, rufous: stipes tufted; leaves glabrous, tripinnatifid to decompound; *ultimate segments cuneate*; veins dichotomously branched: sori at truncate apex of segments; indusium membranous, attached by sides and base, compressed, suborbicular, opening outward. 18 species.

1. **Sphenomeris chinensis** (L.) Maxon (*Stenoloma chinensis* (L.) Bedd., *Odontosoria chinensis* (L.) J. Sm.) (Bd. F. 70). 25–60 cm. tall; fr. IV–XI. Asia, Africa; locally in An., Che., Ki., Ku. Rocks, crevices of walls.
   Better known as *Stenoloma* or *Odontosoria*. Fig. 12.

16. **DAVALLIACEAE** Reichb. 骨碎補科 (Ku Sui Pu K'o)

Usually epiphytic or petrophilous ferns: *rhizome* creeping, *scaly*: leaves remote, articulate to the rhizome, pinnate to finely dissected: sori submarginal or dorsal, terminal on veins, indusiate. (*Nephrolepis* differs in being terrestrial; rhizome short; stipes tufted, not articulate to the rhizome.) 12 genera.

Key to the Genera

Leaves pinnate; pinnae articulate to rachis; stipes not articulate to rhizome	1. *Nephrolepis*
Leaves deltoid, finely dissected; stipes articulate to rhizome.	
Indusium fixed by base and sides	2. *Davallia*
Indusium fixed by base; sides free	3. *Humata*

1. **Nephrolepis** Schott Sword Fern 圓蕨屬 (Yuan Chüeh Shu; Round Fern Genus)

Terrestrial or epiphytic ferns, commonly cultivated in all parts of the world: leaves long and narrow, often stoloniferous; *lamina* pinnatifid or *pinnate*, but in mutants of some species often decompound; *pinnae articulate to the rachis* and often caducous; veins free, forking: sori submarginal or medial; indusium round or reniform, attached by sinus. 35 species. (Greek: *nephros*, kidney, and *lepis*, scale; the indusia

being usually kidney shaped.)

Key to the Species

Leaves 4 to 6 cm. broad; apex of pinnae obtuse ..... 1. *N. cordifolia*
Leaves 8 to 12 cm. broad; apex of pinnae acute ..... 2. *N. exaltata*

1. **Nephrolepis cordifolia** (L.) Presl Narrow Sword Fern (H. S. F. 300). 35–75 cm. tall; fr. I–XII; lower pinnae reduced to lobes. Asia, Australia, South America; locally in Che., Ku. Cultivated.
2. **Nephrolepis exaltata** (L.) Schott Broad Sword Fern (H. S. F. 301). 60–100 cm. tall; fr. I–XII; lower pinnae slightly shortened. Asia, Polynesia, South America; locally in Ku. Cultivated. Mutants are called Boston Fern.

2. **Davallia** Smith Basket Fern 骨碎補属 (Ku Sui Pu Shu; Repair-fractured-bones Genus)

Petrophilous or epiphytic ferns: rhizomes thick, widely creeping, densely covered with ciliate scales: leaves far apart, ovate to deltoid in outline, usually finely dissected: sori at ends of veins, marginal or submarginal; *indusium* tubular or occasionally cup-shaped, *attached by sides as well as base*, often coriaceous. 36 species. (Named for Edmund Davall, 1763–1798, Swiss botanist.)

1. **Davallia mariesii** Moore Maries' Basket Fern 海州骨碎補 (Haichow Ku Sui Pu) (DeV. F. 84). 12–25 cm. tall; fr. V–X; lamina deltoid, quadripinnatifid. China, Japan, Korea; locally in Ku. Cultivated or on rocks. Fig. 13.

3. **Humata** Cav. 陰石蕨属 (Yin Shih Chüeh Shu; Shadystone Fern Genus)

Small petrophilous or epiphytic ferns: rhizomes densely scaly: leaves articulate to the rhizome; lamina coriaceous, usually deltoid in outline, pinnate to tripinnate; fertile leaves usually more dissected than the sterile: *indusium* coriaceous, reniform or suborbicular, *attached by* broad *base*; *sides free*. 43 species. (Latin meaning "of the earth"; since the rhizomes creep on the soil.)

1. **Humata tyermannii** Moore (*Davallia tyermannii* Moore) (H. S. F. 467). 10–25 cm. tall; fr. V–XI; indusium ovate or suborbicular. China; locally in Che., Ki., Ku. On rocks by streams. Fig. 14.

17. **PTERIDACEAE** Gaudich. 蕨科 (Chüeh K'o)

Mostly terrestrial ferns; some petrophilous; some decidedly xerophytic: rhizomes long-creeping or short; some covered with hairs; some with scales: stipe not articulate to rhizome: *sori* marginal, round or linear, borne on the apices of free or connected veins; indusia distinct, confluent or continuous, *formed by the* more or less modified *reflexed leaf margin* (in *Pteridium* the reflexed leaf margin covers an inner thin indusium): veins free, or with the tips of veins connected at the margin: stipes glossy in some genera. 27 genera.

Key to the Genera

a. Indusia reaching nearly to the midrib: leaves decompound; ultimate segments small, elliptical ..... 7. *Onychium*
aa. Indusia not reaching to the midrib.
  b. Sori clearly distinct.
    Rhizome and stipe hairy: sori borne on end of a single vein; indusia small, formed by reflexed marginal lobe ..... 1. *Hypolepis*
    Rhizome and stipe scaly: sporangia borne upon and hidden beneath the reflexed marginal flaps ..... 8. *Adiantum*

bb. Sori confluent or continuous.
c. Sori borne on a marginal vein which connects the apices of the veinlets: stipes not glossy.
Rhizome hairy, without scales: inner thin indusium present under the reflexed leaf margin ..... 2. *Pteridium*
Rhizome and base of stipe scaly: inner indusium absent.. 3. *Pteris*
cc. Sori borne on the tips of unconnected veins: stipes glossy.
Lamina farinose beneath ..... 6. *Aleuritopteris*
Lamina not farinose beneath.
Indusia formed by continuous reflexed margin ..... 4. *Pellaea*
Indusia distinct, often in contact, not continuous ..... 5. *Cheilanthes*

1. **Hypolepis** Bernh. 裸泡蕨属 (Lo Pao Chüeh Shu; Naked Indusiate Fern Genus)

Large terrestrial ferns: rhizome widely creeping; stipes not articulate; leaves herbaceous, bi- to tripinnate; veins free: *sori* round, near margin, single in the sinuses, *protected by reflexed marginal lobes*, these too small to cover them permanently: stipe and rachis viscous-pubescent; hairs multicellular, simple, pointed. 45 species. (From the Greek, meaning " scales underneath ".)

1. **Hypolepis punctata** (Thunb.) Mett. (*Phegopteris punctata* (Thunb.) Mett.) (Bd. F. 295). 70 cm. to 2 m. tall; fr. V–X; leaves tripinnate. Asia, Polynesia; locally in An., Che., Ki. Stream banks.

2. **Pteridium** Gleditsch Bracken Fern 蕨属 (Chüeh Shu)

Large coarse ferns in open or partly shaded habitats: *rhizomes* creeping, covered with simple hairs, *without scales*: leaves deltoid in outline, bipinnate to decompound: sori marginal, linear, continuous; the reflexed margin of the leaf covering a *thin inner* membranous true *indusium*. 6 species. (Name a diminutive of *Pteris*, a fern genus with which genus *Pteridium* has often been merged.)

1. **Pteridium aquilinum** (L.) Kuhn Bracken Fern (*Pteris aquilina* Linn.) (Chüeh) (H. S. F. 162). 40 cm. to 2 m. tall; fr. VII–XI; leaves bipinnate to decompound. Cosmopolitan; locally in An., Che., Ki., Ku. Open hillsides.

3. **Pteris** Linn. 擬蕨属 (I Chüeh Shu; Similar-to-Bracken Fern Genus)

Plants medium to large: *rhizome aud base of stripe scaly*, some species having also hairs: leaves pinnate to tripinnate: sori linear, marginal, continuous, on narrow vein-like receptacle connecting the ends of the forked free veins; indusium formed by the reflexed edge of the leaf. 280 species. (Greek: *Pteris*, a fern.)

Key to the Species

a. Leaves pinnate.
b. Lower pinnae linear, undivided.
Stipe long; lower pinnae longest..... 1. *P. cretica*
Stipe short; lower pinnae shortened ..... 2. *P. vittata*
bb. Lower pinnae again divided, linear, long; sterile pinnae broader than fertile; margins serrate.
Rachis winged; upper pinnae decurrent ..... 3. *P. multifida*
Rachis not winged; terminal pinna sessile or petiolate ..... 1. *P. cretica*
aa. Leaves bipinnate; lateral pinnae unequally bipinnate, the abaxial side of pinna divided, the adaxial side entire or with much shorter lobes ..... 4. *P. semipinnata*

1. **Pteris cretica** Linn. Cretan Brake or Hem Fern (Bd. F. 106). 50–85 cm. tall; fr. VI–XI; pinnae 12–20 cm. long. Cosmopolitan; locally in An., Ku. Cultivated or on damp rocks.
2. **Pteris vittata** Linn. Pinnate Hem Fern (H. S. F. 153; C. Chr. Suppl. 59). 20–90 cm. tall; fr. V–X; pinnae 5–15 cm. long. Cosmopolitan; locally in An. Rocky cliffs.
3. **Pteris multifida** Poir. (*P. serrulata* Linn. f.) Chinese Hem Fern or Spider Brake (H. S. F. 155; C. Chr. 602). 15–65 cm. tall; fr. V–X; pinnae 8–20 cm. long. China, Japan, Korea; locally in An., Che., Ki., Ku. Alleys, by wells, or cultivated.
4. **Pteris semipinnata** Linn. (Bd. F. 109). 20–60 cm. tall; fr. IV–XI; pinnae 3–10 cm. long. Asia; locally in An., Che., Ki., Ku. Rocky ledges.

4. **Pellaea** Link Cliff Fern 旱蕨屬 (Han Chüeh Shu; Drought Fern Genus)

Small tufted fern growing on or among rocks: stipes dark colored, shining; leaves pinnate to tripinnate; ultimate segments small: sori round or oblong, near tips of unconnected free veins, confluent; *indusium continuous, formed by reflexed margin of leaf.* 80 species. (Greek; *pellos*, dusky; the stipes being dark-colored.)

1. **Pellaea nitidula** (Wall.) Baker (Bd. F. 101). 10–20 cm. tall; fr. IV–X; pinnae 1–2 cm. long. China, India; locally in An., Ki. Exposed rocks. Fig. 15.

5. **Cheilanthes** Sw. Lip Fern 唇蕨屬 (Ch'un Chüeh Shu; Lip Fern Genus)

Terrestrial or petrophilous ferns: rhizomes short, scaly: leaves small, usually tufted, pinnate to decompound, pubescent, scaly or rarely glabrous: veins free: sori marginal on tips of veins, confluent at maturity; *indusia* formed by the more or less modified reflexed leaf margin, *distinct, often in contact,* but not *continuous.* Over 100 species. (Greek: *cheilos*, margin, and *anthos*, flower; from the marginal sori.)

1. **Cheilanthes chusana** Hook. (*C. mysurensis* Wall.) (Bd. F. 89; C. Chr. Suppl. III. 54). 12–30 cm. tall; fr. IV–XI; pinnae 1–2 cm. long. Asia; locally in An., Ki. Crevices or walls.

6. **Aleuritopteris** Fée 粉背蕨屬 (Fên Pei Chüeh Shu; Powdery-back Fern Genus)

Small petrophilous ferns: rhizomes short, covered with black linear scales: stipes clustered, dark brown or black, glossy; *lamina* deltoid or ovate; *lower surface* more or less *covered with* white or yellow *farinose powder*; veins free: sori marginal, borne on tips of veinlets; indusium formed by the scarious reflexed leaf margin. 20 species.

Key to the Species

Lamina deltoid; scales at base of stipe only..... 1. *A. argentea*
Lamina ovate; stipe and rachis more or less scaly..... 2. *A. farinosa*

1. **Aleuritopteris argentea** (Gmel.) Fée (*Cheilanthes argentea* (Gmel.) Kze.) (Bd. F. 95). 10–30 cm. tall; fr. IV–X; palmately lobed. China, Japan, Siberia, Malaya; locally in An. On exposed rocks.
2. **Aleuritopteris farinosa** (Forsk.) Fée (*Cheilanthes farinosa* (Forsk.) Kaulf.) Bd. F. 92). 12–25 cm. tall; fr. VII–X; pinnately lobed. Asia, Africa, Tropical America; locally in Ki. On exposed rocks.

7. **Onychium** Kaulf. Claw Fern 烏蕨屬 (Wu Chüeh Shu; Black Fern Genus)

Terrestrial ferns: rhizome creeping, scaly: leaves decompound, subdimorphous;

the sterile more finely dissected than the fertile; stipes long, without scales; fertile segments narrow, elliptical; veins free: sori marginal on a linear receptacle that connects the tips of the veins; *indusium* membranous, formed by the reflexed leaf margin, *nearly broad enough to meet at the costa*. 10 species. (From the Greek term meaning "claw"; referring to the shape of the ultimate segments.)

1. **Onychium japonicum** (Thunb.) Kunze Japanese Claw Fern (H. S. F. 143). 25–80 cm. tall; fr. IV–XII; segments 1 mm. broad. China, Japan, Korea, Philippines, Java; locally in An., Che., Ki., Ku. Stone walls. Fig. 16.

8. **Adiantum** Linn. Maidenhair Fern 鉄線蕨属 (T'ieh Hsien Chüeh Shu; Iron Wire Fern Genus)

Graceful ferns of rocky hillsides, woods and ravines: rhizomes usually creeping; stipes and rachis slender, rigid, glossy, usually dark colored; leaves usually pinnately or palmately compound; pinnules broad, dimidiate oblong or fan-shaped: *sori* marginal, distinct, at the ends of free forking veins; sporangia *borne on the reflexed lobes*. 226 species. (The ancient name, meaning "unwetted"; the foliage shedding rain-drops.)

Key to the Species

a.	Leaves pinnate	1. *A. caudatum*
aa.	Leaves bipinnate.	
	Rachis and rachillae covered with stiff rufous hairs	2. *A. formosum*
	Rachis and rachillae without hairs; pinnules cuneate.	
	Sori borne on margin of leaf lobes; indusium oblong	3. *A. capillus-veneris*
	Sori borne in deep notches of the lobes; indusium reniform	4. *A. cuneatum*

1. **Adiantum caudatum** Linn. Pinnate Maidenhair Fern (Bd. F. 83). 15–30 cm. tall; fr. VII–XII; lamina rooting at apex. Asia, Africa; locally in Ku. Cultivated.
2. **Adiantum formosum** R. Br. Scabrid Maidenhair Fern (H. S. F. 119). 30–60 cm. tall; fr. VII–XII; pinnae rhombic. Australia, New Zealand; locally in Ku. Cultivated.
3. **Adiantum capillus-veneris** Linn. Venus-hair Fern (H. S. F. 123). 10–40 cm. tall; fr. V–XI; scales linear, only borne at base of stipe. Cosmopolitan; locally in An., Che., Ki. Rocky cliffs. Fig. 17.
4. **Adiantum cuneatum** Langsd. & Fisch. Common Maidenhair Fern (H. S. F. 124). 25–50 cm. tall; fr. I–XII; scales ovate, lanceolate, borne on base of stipe and up about 1 cm. South America; locally in Che., Ku. Widely cultivated.

18. **GYMNOGRAMMACEAE** Ching 鳳了草科 (Fêng Liao Ts'ao K'o)

Terrestrial or petrophilous ferns: rhizome creeping, usually short, covered with hairs or scales; stipe not articulate to rhizome; leaves usually pinnate, rarely simple or decompound; veins free, or if reticulate, without included veinlets: *sori* linear, *following the* free or reticulate *veins*, exindusiate. 17 genera.

1. **Coniogramme** Fée 鳳了草属 (Fêng Liao Ts'ao Shu; Phoenix Grass Genus)

Large terrestrial ferns: rhizomes widely creeping, scaly: leaves pinnate to tripinnate, usually glabrous; pinnae large, thin; margins entire or serrulate; veins free or reticulate, ending in hydathodes: sori linear, exindusiate, following the veins from midrib to near the margin. 20 species. (From the Greek, meaning "a dust line"; since the sporangia occur in lines like dust.)

Key to the Species

Veins anastomosing ..... 1. *C. japonica*
Veins free ..... 2. *C. intermedia*

1. **Coniogramme japonica** (Thunb.) Diels (*Gymnogramma japonica* (Thunb.) Desv.) Bamboo Fern (H. S. F. 390). 45–100 cm. tall; fr. VII–X; leaves pinnate above, bipinnate below. China, Japan, Formosa; locally in An., Che., Ki., Ku. Wooded hillsides.
2. **Coniogramme intermedia** Hieron. (Ching 3:143). 40–100 cm. tall; fr. VII–X; distinguished by free venation. China, Japan, India; locally in Ki. Wooded hillsides. Fig. 18.

19. **VITTARIACEAE** Presl 書帶蕨科 (Shu Tai Chüeh K'o)

Epiphytic or petrophilous grass-like ferns, or in some genera very small and moss-like: rhizome creeping, covered with clathrate scales: roots very hairy: leaves simple, usually *linear*, sessile or substipitate; midrib usually distinct; lateral veins absent, simple, or reticulate and without included veinlets; epidermis with idioblasts (spicular cells): *sori* elongate, *along the marginal veins*, exindusiate: prothallia elongate, not cordate. 9 genera.

1. **Vittaria** J. Sm. 書帶蕨屬 (Shu Tai Chüeh Shu; Bookmark Fern Genus)

Epiphytic or petrophilous ferns: rhizomes short, creeping, covered with narrow clathrate scales: roots covered with soft brown hairs: leaves tufted, narrowly linear, entire, grass-like; midrib usually distinct: sori continuous, marginal or intramarginal, often immersed in a groove: leaf margin often recurved. 80 species.

Key to the Species

Inner edge of soral groove prominently raised ..... 1. *V. flexuosa*
Inner edge absent or rudimentary.
Leaves 2–3 mm. broad ..... 2. *V. filipes*
Leaves 5–7 mm. broad ..... 3. *V. japonica*

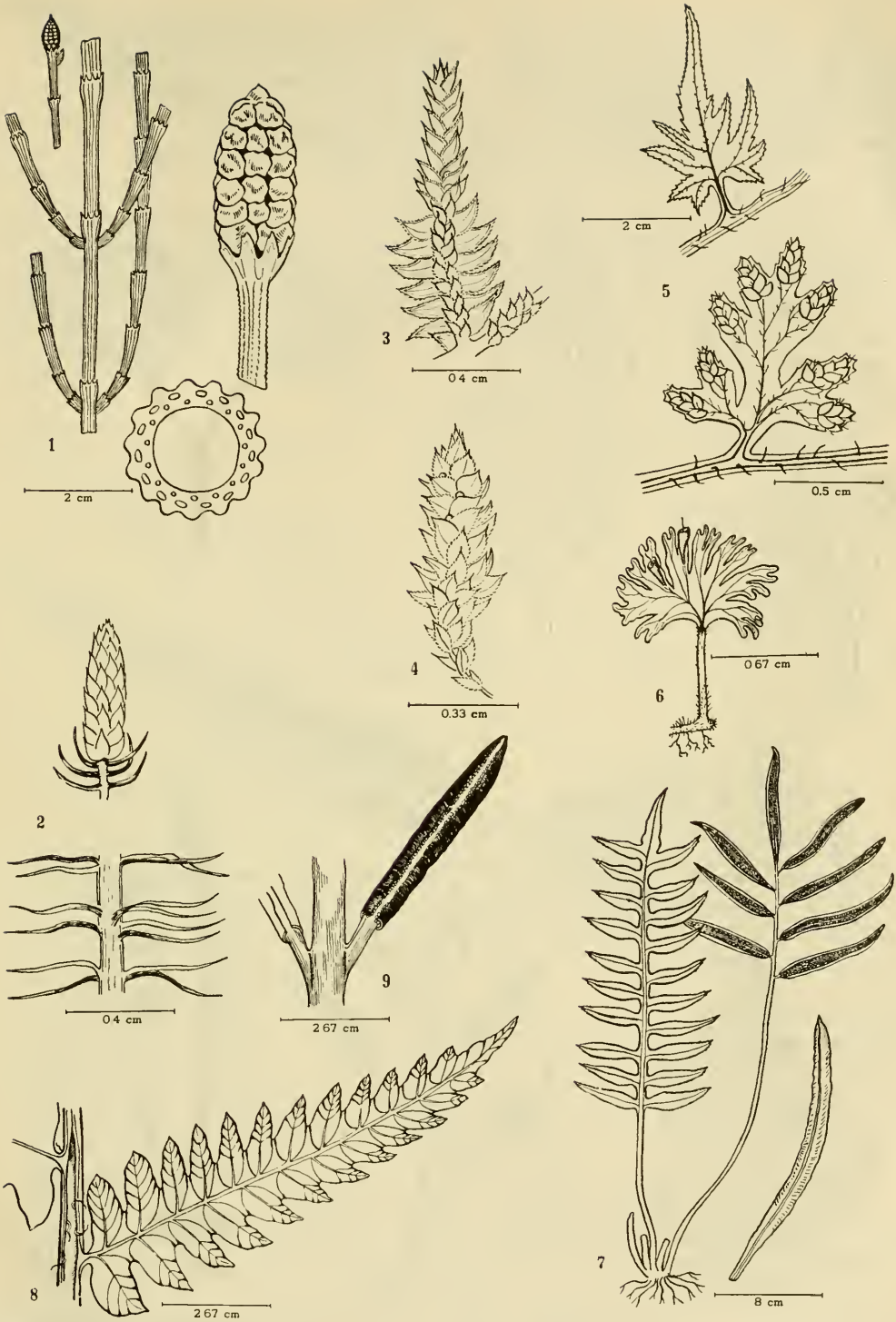
1. **Vittaria flexuosa** Fée (DeV. F. 117). 10–40 cm. tall; fr. VII–VIII; 4–9 mm. broad. China, Japan, Siam, Himalaya; locally in Ki. Rocky ledges by streams. Fig. 19.
2. **Vittaria filipes** Christ (DeV. F. 118). 5–15 cm. tall; fr. VII–VIII; 2–3 mm. broad. China; locally in Ki. Rocky cliffs by streams.
3. **Vittaria japonica** Miq. (DeV. F. 118). Up to 40 cm. tall; fr. VII–X; 6–7 mm. broad. China, Japan, Formosa, Korea; locally in Ki. Rocky ledges by streams.

20. **ASPLENIACEAE** Gray 鉄角蕨科 (T'ieh Koh Chüeh K'o)

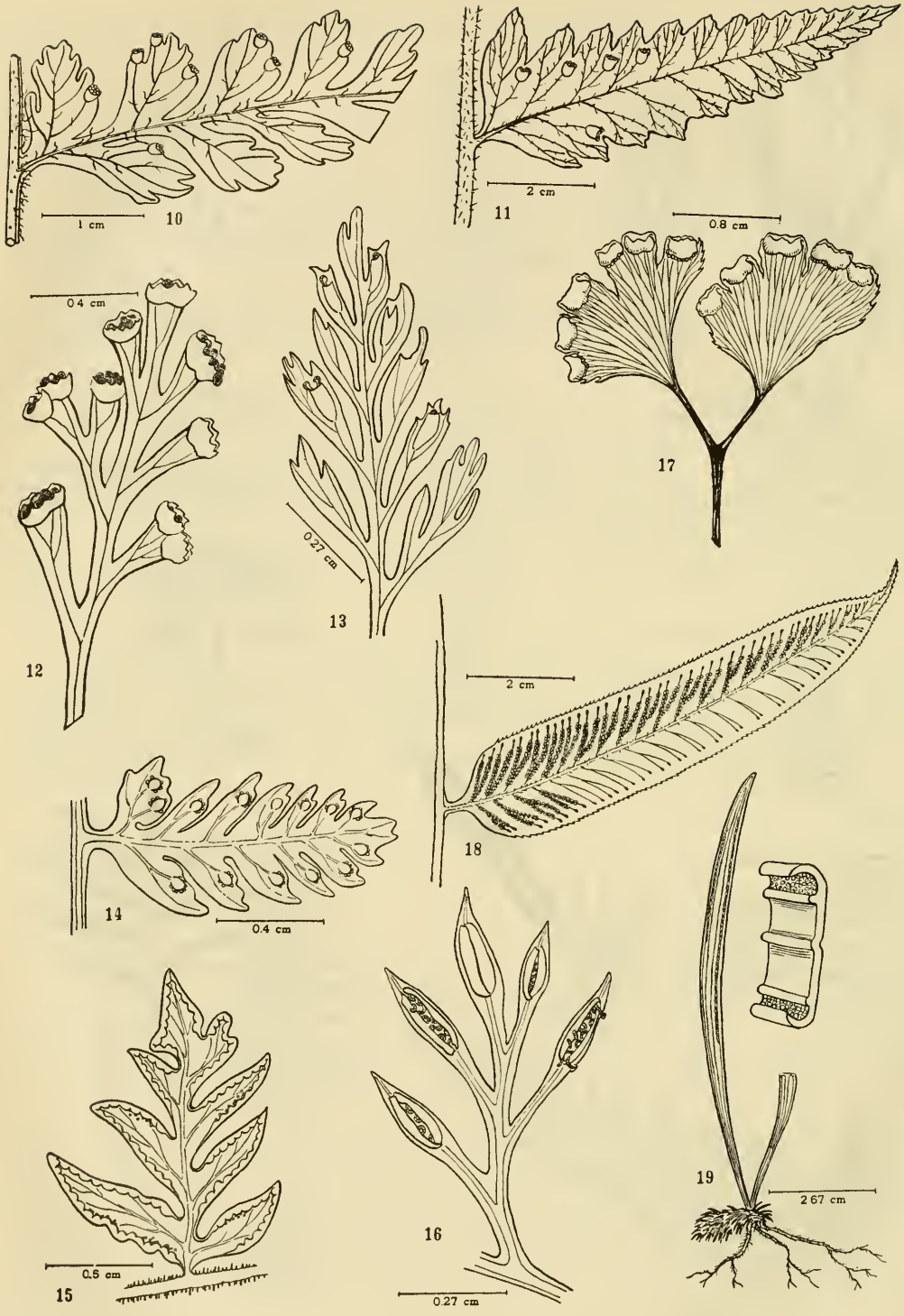
Terrestrial or petrophilous ferns: rhizome creeping or erect, scaly: leaves simple, pinnate, or pinnately decompound; veins usually free: *sori* oblong to linear, *attached to the oblique veinlets*, borne on one or both sides of the veinlet; indusia usually present, sometimes fugacious, single or doubled, or curved and crossing the vein. 21 genera.

Key to the Genera

a. Sori exindusiate ..... 4. *Cornopteris*
aa. Sori with indusia (sometimes fugacious).
Sori often doubled (back to back) ..... 3. *Diplazium*



1. Equisetum ramosissimum
2. Lycopodium cernuum
3. Selaginella moellendorffii
4. Selaginella sinensis
5. Lygodium japonicum
6. Gonocormus minutus
7. Plagiogyria japonica
8. Matteuccia orientalis (sterile)
9. Matteuccia orientalis (fertile)



10. Dennstaedtia scabra
11. Microlepia marginata
12. Sphenomeris chusana
13. Davallia mariesii
14. Humata tyermanni
15. Pellaea nitidula
16. Onychium japonicum
17. Adiantum capillus-veneris
18. Coniogramme intermedia
19. Vittaria flexuosa

Sori single.
Indusia straight: rhizome scales clathrate ..... 1. *Asplenium*
Indusia curved, often crossing the vein: rhizome scales large, thin.. 2. *Athyrium*

1. **Asplenium** Linn. Spleenwort 鉄角蕨属 (T'ieh Koh Chüeh Shu; Iron Horn Fern Genus)

A large genus of small to medium sized ferns of great diversity of form, growing in many parts of the world, terrestrial, petrophilous, or epiphytic: leaves simple to finely dissected: stipes tufted; veins usually free: sori linear or slightly curved, attached to the oblique veinlets; *indusium* single, *straight*: *rhizome scales clathrate.* 650 species. (Greek: *asplenon*, a name used by Dioscorides for some fern supposed to cure diseases of the spleen.)

Key to the Species

a. Leaves simple ..... 1. *A. ensiforme*
aa. Leaves pinnatifid to decompound.
b. Leaves pinnate.
c. Pinnae 7-15 cm. long ..... 2. *A. centrochinense*
cc. Pinnae 0.5-5 cm. long.
d. Apex of pinnae acute.
Stipe and rachis scaly, not glossy ..... 3. *A. crinicaule*
Stipe not scaly, glossy ..... 4. *A. unilaterale*
dd. Apex of pinnae obtuse; stipes glossy.
Pinnae distant, 5-10 mm. long, oval; rachis ridges pale..... 5. *A. trichomanes*
Pinnae approximate, 10-25 mm. long, oblong; rachis ridges concolorous..... 6. *A. normale*
bb. Leaves bipinnatifid to decompound.
Texture thin; lower pinnae much reduced ..... 7. *A. incisum*
Texture firm; lower pinnae not reduced; ultimate divisions narrowly linear ..... 8. *A. sarelii*

1. **Asplenium ensiforme** Wall. (Bd. F. 141). 12–24 cm. tall; fr. VII–IX; stipes short; veins oblique. China, India; locally in Ki. Moss-covered rocks.
2. **Asplenium centrochinense** Christ (Su. B. 182). 45–90 cm. tall; fr. VI–XI; pinnae 7–15 cm., both margins serrulate. China, Japan, Korea, Philippines; locally in An., Ki. Wooded hillsides.
3. **Asplenium crinicaule** Hance (H. S. F. 208). 15–40 cm. tall; fr. V–XII; apex of scales filiform; margins erose to incised. China, India; locally in Ki. Wooded hillsides.
4. **Asplenium unilaterale** Lam. (Bd. F. 152) 25–55 cm. tall; fr. V–IX; pinnae 2–5 cm. long, the lower margins entire, the upper serrate. Asia, Africa; locally in Ki. Along mountain streams.
5. **Asplenium trichomanes** Linn. (H. S. F. 196). 6–35 cm. tall; fr. IV–XI. rachis winged. Cosmopolitan; locally in An., Che., Ki., Ku. Rocky ledges.
6. **Asplenium normale** Don (H. S. F. 197). 12–35 cm. tall; fr. IV–XII; upper edge of pinnae auricled. Asia, Australia, Hawaii; locally in An., Che., Ki. Moss-covered rocks.
7. **Asplenium incisum** Thunb. (H. S. F. 217). 8–35 cm. tall; fr. IV–XII; leaves variable, pinnate to tripinnatifid. China, Korea, Japan, Manchuria; locally in An., Che., Ki., Ku. Stone walls, rocks, stream banks.
8. **Asplenium sarelii** Hook. (*A. saulii* Baker) (H. S. F. 216; C. Chr. 130). 4–20 cm.

tall; fr. V–XI; leaves bipinnate to tripinnate. Eastern Asia; locally in An., Che., Ki., Ku. Crevices of rocks.

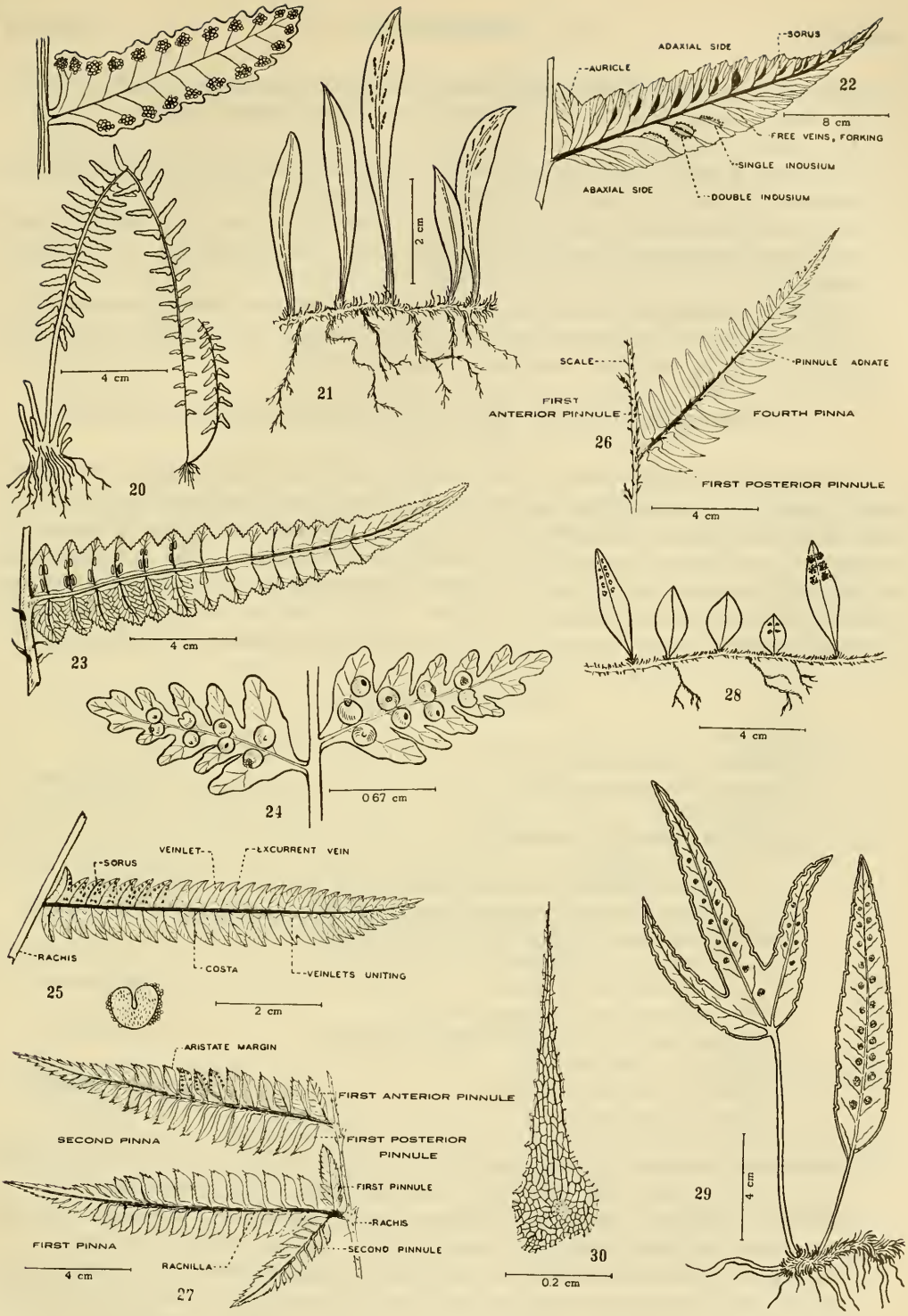
2. **Athyrium** Roth 蹄苞蕨属 (T'i Pao Chüeh Shu; Hoof Indusiate Fern Genus)

Medium to tall terrestrial ferns; leaves often variable in size and degree of cutting, pinnate to decompound: many species bearing spines on upper surface along the sulcate costae: stipes green or stramineous: *scales* on stipe, rachis and rachillae usually few and *thin*, not clathrate: *sori* linear, more or less *curved and crossing the veinlets*, sometimes reniform; indusia sometimes fugacious: veins free, usually ending in clavate tips. About 180 species. (From the Greek, meaning "without shield," the indusia being on only one side of the veinlets.)

Key to the Species

a. Indusia mostly dryopteroid, i.e. reniform.
  Leaves pinnate to bipinnate.
    Pinnae lanceolate or falcate; apices attenuate ..... 1. *A. sheareri*
    Pinnae oblong; apices rounded ..... 2. *A. macrocarpum*
  Leaves tripinnatifid; pinnae 15–30 cm. long ..... 3. *A. viridifrons*
aa. Indusia athyroid to diplazoid, i.e. slightly curved and crossing the veinlet to completely doubled.
  b. Lamina gradually attenuate towards apex.
    c. Lamina pinnate; pinnae falcate ..... 4. *A. wardii*
    cc. Lamina more than once divided; basal pinnules appressed against rachis; with spines along costa on upper surface.
      d. Leaves bipinnatifid; lower pinnae shortened ..... 5. *A. yokoscense*
      dd. Leaves tripinnatifid to tripinnate.
        Lower pinnae 20–30 cm. long ..... 8. *A. giganteum*
        Lower pinnae 4–12 cm. long.
          Lower pinnae alternate; stipe shorter than lamina 6. *A. goeringianum*
          Lower pinnae opposite; stipe longer than lamina 7. *A. devolii*
  bb. Lateral pinnae much longer than the pinnate or bipinnatifid apex, making an abrupt break about 1/4 or less of the way from the apex of the leaf.
    Leaves tripinnatifid to tripinnate ..... 9. *A. niponicum*
    Leaves bipinnate.
      Pinnules acute ..... 9. *A. niponicum*
      Pinnules obtuse ..... 4. *A. wardii*

1. **Athyrium sheareri** (Bak.) Ching (Ching 3:108). 30–50 cm. tall; fr. IV–X; sori small; indusia caducous. China, Japan; locally in Ki. Stream banks.
2. **Athyrium macrocarpum** (Bl.) Bedd. (Bd. F. 165). 25–50 cm. tall; fr. VII–IX; indusia large; margins incised. China, Japan; locally in An., Ki. Damp rocky caves.
3. **Athyrium viridifrons** Mak. (*A. okuboanum* Mak.) (Mak. F. 936; DeV. F. 97). 80–120 cm. tall; fr. VI–X; sori small, round. China, Japan; locally in An., Ki. Stream margins.
4. **Athyrium wardii** (Hook.) Mak. (*Asplenium wardii* Hook.) (H. S. F. 217). 40–60 cm. tall; fr. V–X; indusia not crossing veinlets. China, Korea, Japan; locally in An., Ki. Wooded hillsides.
5. **Athyrium yokoscense** (Fr. & Sav.) Christ (Mak. F. 937). 20–80 cm. tall; fr. VII–X; lower pinnae deflexed. China, Japan; locally in An., Che., Ki. Hillsides.



20. Monachosorum maximowiczii
21. Loxogramme grammitodes
22. Diplazium wichurae
23. Woodwardia japonica
24. Woodsia manchuriensis
25. Cyclosorus acuminatus
26. Dryopteris lacera
27. Rumohra simplicior
28. Lemmaphyllum drymoglossoides
29. Crypsinus hastatus
30. Polypodium niponicum, clathrate scale from rhizome

6. **Athyrium goeringianum** (Kunze) Moore (Ching 3:110). 35–80 cm. tall; fr. V–X; pale linear scales along midrib on upper side. China, Japan; locally in An., Ki., Ku. Wooded hillsides.
7. **Athyrium devolii** Ching (DeV. F. 100). 75–100 cm. tall; fr. VI–IX; pinnae and pinnules recurved. China; locally in Ki. Swampy land.
8. **Athyrium giganteum** DeVol (DeV. F. 100). 140–170 cm. tall; fr. VIII–IX; basal pair of pinnules opposite, appressed against rachis. China; locally in Ki. Swampy land.
9. **Athyrium niponicum** (Mett.) Hance (*Asplenium niponicum* Mett.) Japanese Lady Fern (H.S.F. 227). 35–80 cm. tall; fr. V–XI; exceedingly variable fern. East Asia; locally in An., Che., Ki., Ku. Wooded hillsides.

3. **Diplazium** Sw. 雙苞蕨屬 (Shuang Pao Chüeh Shu; Double-indusiate Fern Genus)

The important characteristic of this genus is that the linear indusia are placed back to back, i.e. one on either side of a vein. Most of the species in this genus have been named *Athyrium* or *Asplenium* by authors. The indusium in this genus is unstable: on some leaves nearly all the *indusia* may be *doubled*, while on another leaf of the same species few if any are doubled; therefore, the keys to *Athyrium* and *Asplenium* should also be consulted if in doubt. About 380 species. (From the Greek, meaning "doubled," the sori being placed back to back on either side of the veinlets.)

Key to the Species

a Leaves simple ..... 1. *D. lanceum*
aa. Leaves pinnate to decompound.
b. Lower pairs of veins uniting ..... 6. *D. esculentum*
bb. Veins all free.
c. Laminae pinnate to bipinnatifid.
d. Pinnae petiolate.
Pinnae falcate, with acute auricle at base ..... 2. *D. wichurae*
Pinnae lanceolate, without acute acuricle..... 3. *D. mettenianum*
dd Pinnae sessile; stipe, rachis, and costa scaly.
Lamina 2–6 cm. broad ..... 5. *D. grammitoides*
Lamina 8–25 cm. broad..... 4. *D. japonicum*
cc. Laminae tripinnatifid to decompound.
Stipe and rachis without scales; indusia fugacious ..... 8. *D. giganteum*
Stipe more or less scaly.
Scales on stipe and rachis black ..... 7. *D. squamigerum*
Scales on stipe brown ..... 9. *D. chinense*

1. **Diplazium lanceum** (Thunb.) Sw. (Bd. F. 174). 12–45 cm. tall; fr. IV–XI; stipe 5–18 cm. long. East Asia; locally in An., Che., Ki., Ku. Stream banks.
2. **Diplazium wichurae** (Mett.) Diels (*Asplenium wichurae* Mett.) (H. S. F. 233). 35–55 cm. tall; fr. V–XI. East Asia; locally in Ki. Stream banks. Fig. 22.
3. **Diplazium mettenianum** (Miq.) C. Chr. (DeV. F. 102). 30–60 cm. tall; fr. V–XI; both margins cut into rounded serrate lobes. China, Japan; locally in An., Ki. Stream banks.
4. **Diplazium japonicum** (Thunb.) Bedd. (*Asplenium japonicum* Thunb.) (H. S. F. 235). 25–70 cm. tall; fr. IV–XI; lvs. broadly lanceolate. East Asia; locally in An., Che., Ki., Ku. Hillsides.

5. **Diplazium grammitoides** (Hook.) Presl (*Asplenium grammitoides* Hook.) (H. S. F. 491). 20–40 cm. tall; fr. VI–X; lvs. narrowly lanceolate, or linear. China, Japan; locally in Ki., Ku. Hillsides.
6. **Diplazium esculentum** (Retz.) Sw. (*Asplenium esculentum* (Retz.) Presl) (H. S. F. 244). 50–160 cm. tall; fr. VII–XI; lvs. variable in size and cutting. East Asia; locally in An., Che., Ki. Edge of water by streams.
7. **Diplazium squamigerum** (Mett.) Christ (*Asplenium squamigerum* Mett.) (H. S. F. 237). 30–45 cm. tall; fr. V–X. East Asia; locally in Ki. Wooded hillsides.
8. **Diplazium giganteum** (Baker) Ching (*Gymnogramme gigantea* Bak.) (DeV. F. 104). 1–2 m. tall; fr. V–XI. China, India; locally in Ki. Wooded hillsides.
9. **Diplazium chinense** (Baker) C. Chr. (*Asplenium chinense* Baker) (H. S. F. 237). 45–70 cm. tall; fr. VII–X; basal pair of pinnules alternate, 1–4 cm. from rachis. East Asia; locally in An., Che., Ku. Damp woods, gardens.

4. **Cornopteris** Nakai 無苞蕨属 (Wu Pao Chüeh Shu; Exindusiate Fern Genus)

Medium sized ferns growing in damp woods: leaves subdeltoid, deeply bipinnatifid to tripinnate, glabrous; pinnae ascending; lowermost pinnae longest; veins free, pinnately forked; scales on stipe few, thin, entire, lanceolate; spines along costae on upper surface: *sori* round or oblong, on the veins, frequently doubled, *exindusiate*. About 12 species.

1. **Cornopteris decurrenti-alata** (Hook.) Nakai (*Gymnogramme decurrenti-alata* Hook.) (H. S. F. 377). 50–90 cm. tall; fr. VII–X; lvs. turn very dark when dried. China, Japan; locally in Ki. By streams in woods.

21. **MONACHOSORACEAE** Ching 光葉蕨科 (Kuang Yeh Chüeh K'o)

Terrestrial or petrophilous ferns: rhizome *without scales or true hairs*, but its apex covered with a mucilaginous excretion in which are minute brown hairs: leaves pinnate to quadripinnate, stipitate; stipes clustered, not articulate to the rhizome; veins free: *sori* terminal on veins, round, *exindusiate*. One genus.

1. **Monachosorum** Kunze 光葉蕨属 (Kuang Yeh Chüeh Shu; Bright-leaved Fern Genus)

Characters of the family. 5 species.

Key to the Species

Leaves pinnate ..... 1. *M. maximowiczii*
Leaves tripinnatifid ..... 2. *M. flagellare*

1. **Monachosorum maximowiczii** (Baker) Hayata (*Polypodium maximowiczii* Baker) (H. S. F. 504). 17–35 cm. tall; fr. VI–X; stoloniferous. China, Japan; locally in Ki. Dripping rocky caves. Fig. 20.
2. **Monachosorum flagellare** (Maxim.) Hayata (*Polypodium flagellare* Maxim.) (DeV. F. 83). 35–60 cm. tall; fr. VII–XI; lower pinnae not shortened. China, Japan; locally in Ki. Dripping rocky caves.

22. **BLECHNACEAE** Presl 羽蕨科 (Yü Chüeh K'o; Feather Fern Family)

Terrestrial, scandent or subarborescent ferns: rhizomes thick, creeping or erect, covered with non-clathrate scales: leaves uniform or dimorphic, stipitate, not articulate to the rhizome; veins free or reticulate, with 1–3 costal areolae: *sori* oblong to linear,

superficial or immersed, *borne on veinlets parallel to midrib of the pinna*; indusia opening towards the midrib (absent in two genera). 8 genera.

1. **Woodwardia** Sm. 狗脊蕨属 (Kou Chi Chüeh Shu; Dog's-back Fern Genus)

Large terrestrial ferns: leaves pinnate or more often bipinnatifid; fertile and sterile leaves alike; veins anastomosing to form a series of areolae along the costa: sori in some species sunken in cavities of the leaf, linear, arranged in rows parallel and contiguous to costae of pinnae and pinnules; indusium opening towards the costa. 10 species. (Named for Thomas J. Woodward, 1745–1820, an English botanist.)

1. **Woodwardia japonica** (L. f.) Sm. (H. S. F. 188). 60–125 cm. tall; fr. IV–XI; segments of the same length on either side of costa. China, Japan, Formosa; locally in An., Che., Ki., Ku. Wooded hillsides. Fig. 23.

23. **WOODSIACEAE** Ching 崴蕨科 (Yen Chüeh K'o)

Small petrophilous ferns: rhizome erect, covered with broad thin scales: leaves clustered, pinnate to tripinnatifid, often covered with chaffy scales and jointed hairs; veins free: stipe not articulate to rhizome, but often with a prominent joint in the stipe below the basal pair of pinnae: sori round, borne at the end of a veinlet; *indusium inferior*, in the form of a membranous sac with an apical opening, or cleft into laciniate segments, or reduced to merely a tuft of crisped hairs around the base. One genus.

1. **Woodsia** R. Br. 崴蕨属 (Yen Chüeh Shu; Cliff Fern Genus)

Characters of the family. 38 species. (Named for Joseph Woods, 1776–1864, an English botanist.)

Key to the Species

Leaves glabrous: indusia globose, sac-like with non-ciliate segments. 1. *W. manchuriensis*
Leaves more or less pubescent: indusia cleft into narrow segments .. 2. *W. polystichoides*

1. **Woodsia manchuriensis** Hook. (H. S. F. 48). 12–38 cm. tall; fr. VII–VIII; stipe not articulate. East Asia; locally in An., Ki. Crevices of rocks. Fig. 24.
2. **Woodsia polystichoides** Eaton (H. S. F. 48). 15–40 cm. tall; fr. VII–X; stipe articulate near base of blade. China, Japan, Manchuria; locally in Ki. Crevices of rocks.

24. **ASPIDIACEAE** Gray 鱗毛蕨科 (Lin Mao Chüeh K'o)

Terrestrial ferns with erect, oblique or creeping rhizomes covered with scales or hairs: stipe usually scaly or pubescent; leaves pinnate to pinnately decompound, stipitate; *pinnae not articulate to the rachis*; stipes not articulate to rhizome; lamina often pubescent, especially on upper side along costa, or scaly beneath; veins free or anastomosing: sori dorsal to subterminal on veins, round or sometimes oblong, usually with indusia; indusium orbicular and attached by center, or reniform and attached by a deep sinus or absent. 58 genera.

Key to the Genera

a. Lamina and stipe pubescent.
  b. Veins free.
    c. Sori exindusiate.
      Sori oblong ..... 2. *Leptogramma*
      Sori round ..... 1. *Thelypteris*

cc. Sori with indusia.
With few or no scales at base of stipe..... 1. *Thelypteris*
Base of stipe covered with bright reddish-brown scales .. 3. *Hypodematium*
bb. Lowest pairs of veinlets of adjoining segments uniting ..... 4. *Cyclosorus*
aa. Lamina not pubescent; stipe and rachis usually bearing few to many chaffy scales
d. Indusium orbicular, attached by center.
Veins free ..... 5. *Polystichum*
Veins anastomosing to forms a series of areolae .... 6. *Cyrtomium*
dd. Indusium reniform, attached by deep sinus.
Rhizome short: leaves tufted, usually catadromous .. 7. *Dryopteris*
Rhizome creeping: leaves distant, anadromous ..... 8. *Rumohra*

1. **Thelypteris** Schmidel 金星蕨属 (Chin Hsing Chüeh Shu; Golden Star Fern Genus)

Rhizome usually widely creeping and leaves distant: lamina bipinnatifid, rarely tripinnatifid to decompound; basal pinnae seldom the largest, often reduced; pinnae linear-lanceolate, usually sessile; veins free; glands common; *stipe* long, *sparsely scaly or without scales*; blades usually pubescent on both surfaces; hairs simple, especially copious along rachis and costa: *sori* small, *round*; indusium usually present, reniform, often fugacious; sporangia setose in some species. 500 species. (An old generic name.)

Key to the Species

a. Sori exindusiate.
Lamina pinnate to bipinnatifid; rachis winged ..... 1. *T. decursive-pinnata*
Lamina tripinnatifid to tripinnate ..... 8. *T. uliginosa*
aa. Sori with indusia, sometimes fugacious.
b. Leaves bipinnatifid.
c. Lower pinnae gradually shortened.
Lamina 6–10 cm. broad ..... 2. *T. nipponica*
Lamina 15–30 cm. broad ..... 3. *T. subocthodes*
cc. Lower pinnae not shortened, or only lowermost pair slightly so.
d. Ultimate segments serrate; veins forked ..... 6. *T. laxa*
dd. Ultimate segments entire; veins simple.
Stipe castaneous.
Under-surface setose; basal pinnae longest: indusia hirsute ..... 5. *T. japonica*
Under-surface glabrous; basal pinnae slightly shortened: indusia glabrous ..... 7. *T. chinensis*
Stipe stramineous ..... 4. *T. glanduligera*
bb. Leaves tripinnatifid to tripinnate.
Leaves large (70–100 cm. tall): indusia glabrous ..... 9. *T. oligophlebia*
Leaves medium sized (30–50 cm. tall): indusia hirtellous. 10. *T. hattorii*

1. **Thelypteris decursive-pinnata** (van Hall) Ching (*Nephrodium decursivepinnata* (van Hall) Baker) (H. S. F. 259). 20–70 cm. tall; fr. V–XI; pinnae adnate. East Asia; locally in An., Che., Ki., Ku. Hillsides.
2. **Thelypteris nipponica** (Fr. & Sav.) Ching (Dev. F. 60). 30–40 cm. tall; fr. VII–VIII; anterior and posterior basal veins run to margin some distance above sinus. East Asia; locally in Ki., Ku. Wooded hillsides.
3. **Thelypteris subocthodes** Ching (Fa. B. 6:305). 6–12 dm. tall; fr. V–XI; basal

anterior vein runs to the callus between the contiguous segments. China, Japan, Korea; locally in An., Ki. At water's edge along streams.

4. **Thelypteris glanduligera** (Kunze) Ching (*Lastrea gracilescens* Hook. var. *glanduligera* Kunze) (Bd. F. Suppl. 51). 25–55 cm. tall; fr. IV–XI; sori marginal. China, Japan, Korea, Formosa; locally in An., Che., Ki., Ku. Wooded hillsides.
5. **Thelypteris japonica** (Baker) Ching (*Dryopteris japonica* (Baker) C. Chr.) (Mak. F. 948). 80–100 cm. tall; fr. VII–XI; sori medial. China, Japan, Korea; locally in Ki. Mountain ravines.
6. **Thelypteris laxa** (Fr. & Sav.) Ching (Fa. B. 6:333). 25–45 cm. tall; fr. V–X; sori medial. China, Japan, Korea; locally in An., Ki., Ku. Wooded hillsides.
7. **Thelypteris chinensis** Ching (Fa. B. 6:311). 1 m. tall; 6–8 veins per segment. China; locally in An. Shaded rocky cliffs.
8. **Thelypteris uliginosa** (Kunze) Ching South China Wood Fern (DeV. F. 63). 1 m. tall; fr. VI–XI; exindusiate. Asia, Australia; locally in Ku. Cultivated.
9. **Thelypteris oligophlebia** (Baker) Ching Kuling Wood Fern (Fa. B. 6:339). 1 m. tall; fr. VI–XI; indusia glabrous. China, Japan, Korea; locally in An., Che., Ki., Ku. Wooded hillsides, streambanks.
10. **Thelypteris hattorii** (H. Ito) Tagawa (*T. nemoralis* Ching) (Fa. B. 6: 338; Ito 141). 35–65 cm. tall; fr. VII–IX; indusia pubescent. China, Japan; locally in An., Ki. Wooded hillsides.

2. **Leptogramma** J. Sm. 溪蕨属 (Chi Chüeh Shu; Stream Fern Genus)

Small ferns of mountain streams, 20–40 cm. tall: leaves tufted, bipinnatifid, herbaceous, hirsute throughout; veins pinnately forked, free: *sori exindusiate, oblong* or linear, along the veins, hirsute. 6 species.

1. **Leptogramma scallanii** (Christ) Ching (Si. 7:101). 20–35 cm. tall; fr. VII–IX; lower pinnae petiolate. China, Tonkin; locally in Ki. In mountain streams.

3. **Hypodematium** Kunze 腫足蕨属 (Chung Tsu Chüeh Shu; Swollen-foot Fern Genus)

Rhizome slender, creeping in crevices or dry rocky limestone cliffs or brick walls; *base of stipe* swollen and *covered with* imbricating *bright rufo-brown* lanceolate *scales*; blade not scaly except at base of stipe; leaves approximate, deltoid, pubescent on both surfaces; basal pinnae largest; venation free: sori dorsal on veins: indusium membranous, reniform, pubescent; margin ciliate. 3 species.

1. **Hypodematium crenatum** (Forsk.) Kuhn (Bd. F. Suppl. 18). 8–45 cm. tall; fr. V–XI; leaves deltoid. Asia, Africa; locally in An., Ku. Crevices of brick walls.

4. **Cyclosorus** (Link) C. Chr. 毛蕨属 (Mao Chüeh Shu; Hairy Fern Genus)

A genus of the dryopteroid group differing from *Thelypteris* in having the *lower pair* or pairs *of veins uniting* and sending an excurrent vein to the sinus: sori round; sporangia glabrous; indusium persistent: blades similar to *Thelypteris* in usually not having scales on stipe or rachis and having soft and simple pubescence on the under side along the veins; under surface often glandular; laminae bipinnatifid to bipinnate. 200 species. (Greek, meaning *round sori*.)

Key to the Species

Base of pinnae narrowed; only 1 or 1 1/2 pairs of veins uniting ..... 1. *C. gongylodes*
Base of pinnae not narrowed.

Base subequal; 3–5 pairs of veins uniting ..... 2. *C. aridus*
Base auricled; 2 pairs of veins uniting..... 3. *C. acuminatus*

1. **Cyclosorus gongylodes** (Schk.) Link (*Aspidium gongylodes* Schk.) (DeV. F. 64). 60–100 cm. tall; fr. VII–X; under surface of leaf densely pubescent. Asia, Africa, South America; locally in Ki. Water, edge of streams.
2. **Cyclosorus aridus** (Don) Ching (*Nephrodium aridum* (Don) J. Sm.) (H. S. F. 291). 75–100 cm. tall; fr. VII–VIII; indusia glabrous. East Asia; locally in Ki. Stream banks.
3. **Cyclosorus acuminatus** (Houtt.) Nakai Chinese Marsh Fern (DeV. F. 65). 30–75 cm. tall; fr. VI–XII; indusia pubescent. East Asia; locally in An., Che., Ki., Ku. Stream banks. Fig. 25.

5. **Polystichum** Roth Holly Fern 耳蕨属 (Êrh Chüeh Shu; Ear Fern Genus)

Tufted evergreen terrestrial ferns, commonly growing in woods: leaves usually subcoriaceous to coriaceous; margins usually spinulose and aristate; *veins free*, pinnately forking; stipes and rachis generally scaly: sori round, dorsal on veins; *indusium* superior, *orbicular*, *centrally attached*, rarely absent: scales often discolorous. About 175 species. (Greek: *poly*, many, and *stichos*, row; the sori of some species being in many ranks.)

Key to the Species

a. Leaves pinnate.
Apex of leaf often radicant; pinnae 3–5 cm. long: indusia minute or absent ..... 1. *P. lepidocaulon*
Apex not radicant; pinnae 1–2 cm. long ..... 2. *P. deltodon*
aa. Leaves bipinnate.
b. Leaves tripartite, with a long terminal pinnate portion and with a pair of much larger, pinnate basal pinnae ..... 3. *P. tripteron*
bb. Leaves lanceolate.
Scales on stipe dark brown to black, caducous ..... 4. *P. tsus-simense*
Scales rufous-brown, dense, persistent.
Basal scales dark brown with lighter margins, 2–3mm. broad. 5. *P. setiferum*
Basal scales concolorous, 5–9 mm. broad ..... 6. *P. neolobatum*

1. **Polystichum lepidocaulon** (Hook.) Sm. (*Aspidium lepidocaulon* Hook.) (H. S. F. 250). 20–40 cm. tall; fr. V–X; 2 rows of sori on either side of costa. China, Japan; locally in An., Ki., Ku. Stream banks.
2. **Polystichum deltodon** (Baker) Diels (Di. P. 1 (4):191). 20–40 cm. tall; fr. VI–XI; 1 row of sori along adaxial margin, few sori on lower side. China; locally in An. Stream banks.
3. **Polystichum tripteron** (Kunze) J. Sm. (Mak. F. 945). 25–50 cm. tall; fr. IV–X. China, Japan; locally in An. Rocky hillsides.
4. **Polystichum tsus-simense** (Hook.) J. Sm. Tsusima Holly Fern (B. M. 88). 20–40 cm. tall; fr. IV–X; sori medial. China, Japan; locally in An., Che., Ki., Ku. Wooded hillsides.
5. **Polystichum setiferum** (Forsk.) Woynar var. **Fargesii** (Christ) C. Chr. (DeV. F. 79). 45–60 cm. tall; fr. IV–X; undersurface with many fibrillose scales. China, Japan; locally in An., Che., Ki., Ku. Wooded hillsides.
6. **Polystichum neolobatum** Nakai 50–100 cm. tall; fr. IV–X; underside sparsely scaly. China; locally in An., Ki. Wooded hillsides.

6. **Cyrtomium** Presl 貫衆蕨屬 (Kuang Chung Chüeh Shu; Spike-like Fern Genus)

Leaves evergreen, coriaceous, pinnate: stipe scaly: *veins anastomosing and forming* sub-hexagonal *areolae* enclosing 1–3 excurrent veinlets: sori multiseriate on either side of costa, dorsal on veinlets: indusium large, orbicular, persistent or caducous. 11 species. (From the Greek, meaning "a bow.")

Key to the Species

Leaves terminating in a pinnatifid apex ..... 1. *C. balansae*
Leaves terminating in a distinct end pinna.
Margins thickened, entire, undulate ..... 2. *C. falcatum*
Margins serrulate, at least at the apex..... 3. *C. fortunei*

1. **Cyrtomium balansae** (Christ) C. Chr. (DeV. F. 80). 30–70 cm. tall; fr. VI–XI; margins aristate. China, Japan, Tonkin; locally in An., Ki. Stream bank.
2. **Cyrtomium falcatum** (L. f.) Presl House Holly Fern (Ching 3:127). 15–80 cm. tall; fr. IV–XI; leaves coriaceous. Asia, Africa; locally in Che., Ku. Rocks along the coast.
3. **Cyrtomium fortunei** J. Sm. Fortune's Holly Fern (Ching 3:126). 20–75 cm. tall; fr. V–XI, leaves chartaceous. East Asia; locally in An., Che., Ki., Ku. Woods, alleys.

7. **Dryopteris** Adans. 鱗蕨屬 (Lin Chüeh Shu; Scaly Fern Genus)

Leaves tufted, of subcoriaceous texture, sometimes herbaceous: *rhizomes short*, scaly: leaves pinnate to decompound; margins usually serrate or spinulose; stipe and rachis often scaly; lamina without hairs; veins free, forked or simple; usually catadromous in all divisions, except in the basal pair of pinnae: indusium usually large, persistent, reniform, attached by a sinus, sometimes absent. 150 species. (Greek: *drys*, oak, and *pteris*, fern.)

Key to the Species

a. Lamina pinnate.
b. With a large terminal pinna ..... 1. *D. sieboldii*
bb. With a pinnatifid apex.
c. Sori small, multiseriate.
Stipe with only a few scales at base: rachis without scales ..... *Athyrium sheareri**
Stipe and rachis scaly.
Scales black ..... 2. *D. cycadina*
Scales light brown ..... 3. *D. dickinsii*
cc. Sori large, in one row on either side of the costa.
Pinnae oblong: indusia laciniate..... *Athyrium macrocarpum**
Pinnae falcate: indusia entire ..... 10. *D. decipiens*
aa. Lamina bipinnate to decompound.
d. Lamina bipinnatifid to bipinnate.
e. Pinnae of upper 1/4 to 1/2 of leaf soriferous.
Sori bearing pinnae contracted, soon withering.. 5. *D. lacera*
Sori bearing pinnae not contracted..... 6. *D. uniformis*
ee. All pinnae soriferous.
f. Without small rounded bullate scales on underside.

* Two species of *Athyrium* which closely resemble *Dryopteris* are placed in this key to help in their identification.

Lamina bipinnatifid; stipe scales light brown. 4. *D. panda*
Lamina bipinnate; stipe and rachis densely scaly; scales reddish brown ..... 13. *D. championii*

ff. With bullate scales on underside.
Scales on stipe few, entire, narrow, dark brown ..... 12. *D. erythrosora*
Scales abundant.
Bullate scales abundant; stipe and rachis scales dark brown, entire ..... 11. *D. fuscipes*
Bullate scales few, small; stipe and rachis scales reddish-brown, fimbriate ..... 13. *D. championii*

dd. Lamina tripinnatifid to decompound.

g. With bullate scales on under-surface.
Texture coarse: stipe and rachis densely scaly; scales of various colors, light brown to black. 14. *D. varia*
Texture thin: scales few; lamina anadromous.... 15. *D. miqueliana*

gg. Without bullate scales beneath.
Stipe castaneous, at least at base ..... 8. *D. sparsa*
Stipe stramineous.
Without scales, except at base of stipe..... 7. *D. gymnophylla*
Stipe and rachis with small scales ..... 9. *D. chinensis*

Two species of *Athyrium*(*) which closely resemble *Dryopteris* are placed in this key to help in their identification.

1. **Dryopteris sieboldii** (van Houtt.) Ktze. (*Nephrodium sieboldii* (van Houtt.) Hook.) (H. S. F. 261). 60–80 cm. tall; fr. IV–X; lvs. with a terminal pinna, and 1 to 3 prs. of lateral pinnae. China, Japan; locally in Che., Ki. Wooded ravines.
2. **Dryopteris cycadina** (Fr. & Sav.) C. Chr. (DeV. F. 69). 30–80 cm. tall; fr. V–XI; pinnae to 12 cm. long. Asia; locally in An., Che., Ki., Ku. Wooded hillsides.
3. **Dryopteris dickinsii** (Fr. & Sav.) C. Chr. (DeV. F. 69). 30–45 cm. tall; fr. VI–X; pinnae 6 to 8 cm. long. China, Japan; locally in An., Ki. Wooded hillsides.
4. **Dryopteris panda** (Clarke) Christ (Fa. B. 8:418). 20–50 cm. tall; fr. VI–IX; pinnules crenate; indusia large. Asia; locally in Ki. Dripping rocky caves.
5. **Dryopteris lacera** (Thunb.) Ktze. (*Nephrodium lacerum* (Thunb.) Baker) (H. S. F. 273). 30–65 cm. tall; fr. V–XI; base of stipe with larger linear brown scales. East Asia; locally in An., Ki. Exposed hillsides. Fig. 26.
6. **Dryopteris uniformis** Mak. (Mak. F. 953). 35–60 cm. tall; fr. V–XI; scales black on stipe. East Asia; locally in An., Ki., Ku. Wooded hillsides.
7. **Dryopteris gymnophylla** (Baker) C. Chr. (Fa. B. 8:468). 35–55 cm. tall; fr. VI–XI; first pinnule on basal pinna largest. China; locally in Ki., Ku. Wooded ravines.
8. **Dryopteris sparsa** (Ham.) Ktze. (*Nephrodium sparsum* (Ham.) Don) (H. S. F. 276). 30–80 cm. tall; fr. V–XI; lamina much longer than broad. Asia; locally in An., Che., Ki., Ku. Woods.
9. **Dryopteris chinensis** (Baker) Koidz. (*Nephrodium chinense* Baker) (H. S. F. 278). 18–36 cm. tall; fr. V–X; basal pinna largest. East Asia; locally in An., Ki., Ku. Wooded hillsides.
10. **Dryopteris decipiens** (Hook.) Ktze. (*Nephrodium decipiens* Hook.) (H.S.F. 260). 30–50 cm. tall; fr. VI–X; scales on stipe glossy, purplish brown. China, Japan; locally in An., Ki. Wooded hillsides.
11. **Dryopteris fuscipes** C. Chr. (Fa. B. 8:476). 30–80 cm. tall; fr. IV–XI; first pinnule

on basal pinna shortened. China, Japan; locally in An., Che., Ki., Ku. Woods.

12. **Dryopteris erythorosora** (Eaton) Ktze. (Fa. B. 8:481). 40–85 cm. tall; fr. V–XI. East Asia; locally in An., Ki. Woods.
13. **Dryopteris championii** (Benth.) C. Chr. (Ching 4:181). 45–90 cm. tall; fr. IV–XI; pinnules auricled on both sides. China; locally in An., Che., Ki., Ku. Wooded hillsides.
14. **Dryopteris varia** (L.) Ktze. (*Aspidium varium* (L.) Sw.) (H.S.F. 254). 20–90 cm. tall; fr. IV–XII; bullate scales plentiful. East Asia; locally in An., Che., Ki., Ku. Wooded hillsides.
15. **Dryopteris miqueliana** (Maxim.) C. Chr. (*Rumohra miqueliana* (Maxim.) Ching) (Si. 5:67). 40–55 cm. tall; fr. VII–X. East Asia; locally in Ki. Moist woods.

8. **Rumohra** Raddi 複耳蕨属 (Fu Erh Ĉhüeh Shu; Many-eared Fern Genus)

Rhizomes stout, widely *creeping*, densely scaly; scales entire, concolorous: leaves distant: *lamina* deltoid, with broad base, tripinnatifid to decompound, *anadromous* in arrangement of pinnules, i.e. with the first pinnule directed toward apex of leaf; margins aristate; veins free: sori dorsal or subterminal on veins; indusium usually orbicular-reniform, attached by a deep sinus, sometimes peltate. 50 species.

Key to the Species

a. Apex of pinnules obtuse; scales on stipe lanceolate, entire, glossy .. 1. *R. amoena*
aa. Apex of pinnules acute; scales on stipe linear-lanceolate with very long attenuate tips, caducous.
Both margins of pinnules incised, lobed..... 2. *R. aristata*
Lower margin of pinnules entire or nearly so.
Pinnules long and narrow, 12 to 25 mm. long ..... 3. *R. simplicior*
Pinnules short and wide, 10 to 15 mm. long ..... 4. *R. amabilis*

1. **Rumohra amoena** Ching (DeV. F. 75). 50–90 cm. tall; fr. VII–XI; not scaly except at base of stipe. China; locally in Che., Ki. Woods.
2. **Rumohra aristata** (Forster) Ching (*Aspidium aristatum* (Forster) Sw.) (H.S.F. 255). 40–80 cm. tall; fr. VII–IX; pinnules deeply cleft, especially on the upper margin. Asia; locally in An., Che., Ki., Ku. Woods.
3. **Rumohra simplicior** (Mak.) Ching (Si. 5:43). 40–80 cm. tall; fr. IV–XII; scales reddish-brown to nearly black, dense. China, Japan; locally in An., Che., Ki. Woods. Fig. 27.
4. **Rumohra amabilis** (Bl.) Ching (*Aspidium amabile* Bl.) (H.S.F. 254). 45–90 cm. tall; fr. V–XII; first adaxial pinnules not elongated and again divided as in *R. simplicior*. Asia; locally in An., Che., Ki., Ku. Woods.

25. **POLYPODIACEAE** R. Br. 水龍骨科 (Shui Lung Ku K'o)

Epiphytic, petrophilous or terrestrial ferns: rhizomes creeping, usually densely scaly: stipes usually articulate to the rhizome; *leaves* simple or pinnate, rarely palmately divided; venation free or variously reticulate: sori exindusiate, round, linear, or spread over the surface of the lamina. 65 genera.

Key to the Genera

a. Leaves simple.
b. With stellate hairs on lamina.
Sori spread over under-surface ..... 1. *Pyrrosia*
Sori in a single continuous row between margin and costa: margins reflexed..... 2. *Saxiglossum*

bb. Without stellate hairs.
c. Sori linear, oblique to costa.
Leaves stipitate; lateral veins distinct ..... 3. *Colysis*
Leaves subsessile; veins indistinct ..... 4. *Loxogramme*
cc. Sori round or oval.
d. Leaves dimorphous, fleshy ..... 5. *Lemmaphyllum*
dd. Leaves uniform.
e. Sori multiseriate.
Lamina glabrous ..... 6. *Microsorium*
Lamina with peltate scales; stipe scaly ..... 7. *Neocheiropteris*
ee. Sori in a single row on either side of costa.
f. Lamina glabrous: sori without peltate scales.
Margin thin, entire ..... 6. *Microsorium*
Margin cartilaginous, notched ..... 8. *Crypsinus*
ff. Lamina with peltate scales, at least when young:
Sori with peltate scales.
Stipe long, scaly; lateral veins distinct .... 7. *Neocheiropteris*
Stipe short; veins not distinct ..... 9. *Lepisorus*
aa. Leaves pinnately or palmately lobed, or pinnate.
g. Leaves trifid; margin cartilaginous, notched ..... 8. *Crypsinus*
gg. Leaves pinnatifid to pinnate.
h. Sori linear ..... 3. *Colysis*
hh. Sori round.
Rhizome covered with humus-collecting leaves ..... 12. *Drynaria*
Rhizomes without humus-collecting leaves.
Pinnae articulate to the rachis ..... 10. *Arthromeris*
Pinnae adnate to the rachis ..... 11. *Polypodium*

1. **Pyrrosia** Mirbel 石韋屬 (Shih Wei Shu; Rock-reed Genus)

Small to medium-sized petrophilous ferns: rhizomes creeping, scaly: leaves usually simple, coriaceous; *under-surface* covered *with stellate hairs*; veins obscure: *sori* round, superficial or partly immersed, usually *covering the under-side of the leaf*, exindusiate. 95 species. The name *Cyclophorus* Desv. has been generally used for this genus.

Key to the Species

a. Leaves linear, sessile, 2–4 mm. broad ..... 1. *P. assimilis*
aa. Leaves oblong, ovate or lanceolate, stipitate.
Rhizome thick: leaves approximate, large, 30–45 cm. tall ..... 2. *P. sheareri*
Rhizomes slender, widely creeping: leaves distant; lamina usually small.
Sori distinct: lateral veins visible ..... 3. *P. lingua*
Sori confluent: veins not distinct ..... 4. *P. petiolosa*

1. **Pyrrosia assimilis** (Baker) Ching (DeV. F. 129). 7–20 cm. tall; fr. V–XI. China; locally in An., Che., Ki. Exposed rocks.
2. **Pyrrosia sheareri** (Baker) Ching (Ching 3:147). 30–45 cm. tall; fr. V–X; 3–5 cm. broad. China, Formosa, Tonkin; locally in An., Che., Ki. Mountain streams.
3. **Pyrrosia lingua** (Thunb.) Farwell Tongue Fern (DeV. F. 129). 8–30 cm. tall; fr. IV–XI; upper surface sparsely pitted. East Asia; locally in An., Che., Ki., Ku. Exposed rocks.
4. **Pyrrosia petiolosa** (Christ) Ching (DeV. F. 129). 3–15 cm. tall; fr. IV–X; upper surface deeply pitted. China, Manchuria; locally in An., Ku. Exposed rocks.

2. **Saxiglossum** Ching 擬石葦属 (Ih Shih Wei Shu; Like-the-rock Weed Genus)

Petrophilous: rhizomes creeping, densely covered with rufous lanceolate scales: leaves linear, subsessile; midrib deeply grooved and prominent; margins reflexed; stellate hairs dense on lower side, sparse on upper side: *sori* linear, *in one row on either side of costa.* One species.

1. **Saxiglossum taenioides** (C. Chr.) Ching (Ching 3:146). 3–12 cm. tall; fr. V–XI; leaves 3–4 mm. broad. China, Formosa; locally in An., Ki., Ku. Exposed rocks.

3. **Colysis** Presl 線蕨属 (Hsien Chüeh Shu: Thread Fern Genus)

Terrestrial ferns: rhizomes creeping; scales ovate to lanceolate, fuscous, clathrate: leaves large, *stipitate*; lamina simple, pinnately or palmately lobed; pinnae adnate to rachis; *lateral veins distinct*; areolae with included veinlets: sori linear, continuous or interrupted, one between each pair of lateral veins, oblique to costa. 25 species.

Key to the Species

Leaves simple ..... 1. *C. henryi*
Leaves pinnatifid to pinnate..... 2. *C. elliptica*

1. **Colysis henryi** (Baker) Ching (Ching 2:91). 30–60 cm. tall; fr. VII–XI; leaves 5 cm. broad. China; locally in Ki., Ku. Rocks by streams.
2. **Colysis elliptica** (Thunb.) Ching (Ching 1:91) 30–60 cm. tall; fr. IV–XI; rachis narrowly winged. Asia; locally in An., Che., Ki. Rocks by streams.

4. **Loxogramme** (Bl.) Presl 劍蕨属 (Chien Chüeh Shu; Two-edged Sword Fern Genus)

Epiphytic or petrophilous ferns: rhizomes creeping, with ovate entire dark brown scales: roots very hairy: *leaves subsessile*, somewhat clustered, not articulate to the rhizomes; lamina simple, entire, sessile or nearly so; *veins indistinct*; areolae without included veinlets: sori linear, oblique to costa or rarely subparallel, without paraphyses, exindusiate. 36 species.

Key to the Species

Leaves oblanceolate, with attenuate apex ..... 1. *L. salicifolia*
Leaves spatulate; apex acute or obtuse..... 2. *L. grammitodes*

1. **Loxogramme salicifolia** Mak. (Ching 4:190). 15–35 cm. tall; fr. VI–XI. East Asia; locally in Ki. Moss-covered rocks.
2. **Loxogramme grammitodes** (Baker) C. Chr. (Ching 4:189). 3–10 cm. tall; fr. VI–VIII. China, Japan; locally in Ki. Moss-covered rocks. Fig. 21.

5. **Lemmaphyllum** Presl 石蓮属 (Shih Lien Shu; Rock Lotus Genus)

Small epiphytic or petrophilous ferns with very slender widely creeping rhizomes; rhizome scales few, thin, clathrate, fuscous, lanceolate, entire or ciliate: leaves far apart, entire, somewhat *fleshy* usually distinctly *dimorphous*; fertile leaves linear or linear-lanceolate, sterile leaves obovate, or ovate; venation usually hidden, veins anastomosing forming 3 or 4 series of areolae with free included veinlets: sori round or linear, exindusiate, with clathrate, peltate scales when young. 10 species.

L. drymoglossoides and *L. subrostratum* usually have two types of leaves but the sori may be borne on the broader ovate leaves as well as on the narrow linear-lanceolate ones. For this reason Ching placed these in a distinct genus *Lepidogrammitis*.

1. **Lemmaphyllum drymoglossoides** (Baker) Ching (Ching 2:79). 1–6 cm. tall; fr. V–XI; lvs. oval to linear-elliptical. China; locally in An., Che., Ki., Ku. On rocks in shaded ravines. Fig. 28.

6. **Microsorium** Link Strap Fern 星蕨属 (Hsing Chüeh Shu; Star Fern Genus)

Usually epiphytic ferns: rhizomes creeping; scales clathrate: stipes remote, articulate; *lamina* usually simple, herbaceous, *glabrous*; *margins entire*; veins reticulate; areolae with included forked veinlets: sori round, without paraphyses, usually small and multiseriate, rarely uniseriate or biseriate.

Key to the Species

Sori small, multiseriate from margin to costa..... 1. *M. buergerianum*
Sori large, usually only uni- to biseriate..... 2. *M. fortunei*

1. **Microsorium buergerianum** (Miq.) Ching (Ching 2:85). 10–30 cm. tall; fr. IV–IX; leaves broadest near base. Asia; locally in An., Ki. Stream banks.
2. **Microsorium fortunei** (Moore) Ching (Ching 2:83). 30–75 cm. tall; fr. IV–XII; leaves broadest in middle. Eastern Asia; locally in An., Che., Ki., Ku. On rocks along stream banks.

7. **Neocheiropteris** Christ 扇蕨属 (Shan Chüeh Shu; Fan Fern Genus)

Terrestrial ferns: rhizomes widely creeping, densely scaly; scales iridescent, clathrate, with protruding arms: *stipes long*, remote, *scaly*; *lamina* herbaceous, simple and entire, or trifid, or palmately lobed, sparingly covered *with peltate scales*; veins reticulate; areolae with included branched veinlets; lateral veins distinct; sori round or oblong, in one to three rows on either side of the costa, covered by peltate clathrate paraphyses. 5 species.

1. **Neocheiropteris phyllomanes** (Christ) Ching (Ching 2:89). 20–50 cm. tall; fr. V–X; lamina broadly ovate. East Asia; locally in An., Che., Ki., Ku. Stream banks.

8. **Crypsinus** Presl 硬邊蕨属 (Ying Pien Chüeh Shu; Stiff-margin Fern Genus)

Small to medium-sized epiphytic or petrophilous ferns: rhizomes creeping; scales narrowly lanceolate, attenuate: stipe remote, articulate; leaves simple, pinnate or *trifid*, often dimorphous; *margins cartilaginous and notched*; main veins distinct: sori usually uniseriate on each side of the costa, one between each of the lateral veins; paraphyses absent, or if present filamentous. 40 species.

1. **Crypsinus hastatus** (Thunb.) Copel. 金鶏脚 (Chin Chi Chio; Golden Pheasant Feet) (*Phymatodes hastata* (Thunb.) Ching) (H.S.F. 361). 12–35 cm. tall; fr. V–X; leaves simple or trifid. Asia; locally in An., Che., Ki., Ku. Rocks, stream banks. Fig. 29.

9. **Lepisorus** J. Sm. 瓦韋属 (Wa Wei Shu; Tile-reed Genus)

Small to medium-sized epiphytic or petrophilous ferns: leaves articulate to the rhizome, simple linear to lanceolate; *stipe* usually *short*; texture coriaceous; lamina bearing peltate scales, at least when young; *veins anastomosing*, often obscure; sori large, round, uniseriate, covered with clathrate peltate paraphyses, at least when young: rhizome creeping, covered with ovate to linear clathrate scales. 40 species.

Key to the Species

a. Lamina linear, 1.5–2.0 mm. broad ..... 1. *L. lewisii*
aa. Lamina 0.6–3.0 cm. broad.
Rhizome scales broadly ovate, obtuse: stipe long ..... 2. *L. macrosphaerus*
Rhizome scales narrow lanceolate to subulate.
Sori medial ..... 3. *L. thunbergianus*
Sori nearer costa ..... 4. *L. oligolepidus*

1. **Lepisorus lewisii** (Baker) Ching (Ching 2:57). 4–8 cm. tall; fr. VII–X; margins reflexed to costa. China; locally in An., Ki. Rocks.
2. **Lepisorus macrosphaerus** (Baker) Ching var. **asterolepis** (Bak.) Ching (Ching 2:63). 15–20 cm. tall; fr. IV–VII; sori medial. China; locally in An., Ki. Rocks.
3. **Lepisorus thunbergianus** (Kaulf.) Ching (*Polypodium lineare* Thunb., non Burm., nec Houtt.) (Ching 2:76). 6–18 cm. tall; fr. V–XI; lamina narrowly linear-lanceolate; scales few. Asia; locally in An., Che., Ki., Ku. Rocks.
4. **Lepisorus oligolepidus** (Baker) Ching (Ching 2:70). 7–16 cm. tall; fr. IV–X; lamina lanceolate; scales many. China; locally in An., Che., Ki. Rocks.

10. **Arthromeris** J. Sm. 節枝蕨属 (Chieh Chih Chüeh Shu; Jointed-branch Fern Genus)

Terrestrial or epiphytic ferns of moderate size: rhizomes thick, long-creeping, covered with non-clathrate scales: stipe long, articulate, remote: leaves pinnate; *pinnae* large, lanceolate, opposite, *articulate to the rachis*; margins entire, cartilaginous; lateral veins distinct; minor venation indistinct; areolae with included veinlets; sori round, one to many between the main veins, without paraphyses. 9 species.

1. **Arthromeris lehmannii** (Mett.) Ching (*Polypodium lehmannii* Mett.) (H.S.F. 369). 15–60 cm. tall; fr. VII–IX; rhizome scales yellowish brown. China, Siam, Burma; locally in Ki. Stream banks, rocks.

11. **Polypodium** Linn. Polypody 水龍骨属 (Shui Lung Ku Shu; Water-dragon-bone-Genus)

Epiphytic or petrophilous ferns: rhizomes creeping, scaly: leaves stipitate, articulate to the rhizome; lamina pinnatifid to pinnate; *pinnae adnate*; veins forked and free; or more often anastomosing to form a row of costal areolae, each with one simple excurrent veinlet: sori exindusiate, round, terminal on the excurrent veinlet if areolae are present. 75 species. (Greek: *poly*, many, and *pous*, foot; referring to the branched rhizome.)

Key to the Species

Margins of lamina serrate: rhizome and rachis scaly ..... 1. *P. amoenum*
Margins of lamina ciliate: rhizome covered with whitish bloom, turning black in dried specimens: scales few ..... 2. *P. niponicum*

1. **Polypodium amoenum** Wall. (Ching 2:99). 25–60 cm. tall; fr. V–XI; leaves deeply pinnatifid. China, India; locally in An., Ki. Rocks.
2. **Polypodium niponicum** Mett. (Ching 2:98). 18–32 cm. tall; fr. IV–XII. China, Japan; locally in An., Ki., Ku. Rocks. Fig. 30.

12. **Drynaria** (Bory) J. Sm. Oak Fern 槲蕨属 (Hu Chüeh Shu; Oak Fern Genus)

Large epiphytic or petrophilous ferns: *rhizomes* stout, densely scaly, covered

with humus-collecting leaves; scales rufous, non-clathrate; margins fimbriate: leaves dimorphous; one always sterile, brown, rigid, sessile, similar to an oak leaf; the other large, green, pinnatifid or pinnate; veins anastomosing and forming rectangular areolae with included veinlets: *sori round*, exindusiate, numerous. 20 species. (From the Greek, meaning "oak-leaf".)

1. **Drynaria fortunei** (Kunze) J. Sm. Fortune's Oak Fern (Ching 4:192). 15–40 cm. tall; fr. IV–XI; sterile leaves 5–8 cm. long. China; locally in An., Che., Ki., Ku. Tree trunks or rocks.

II. SPERMATOPHYTA Seed Plants 種子植物部
(Chung Tzŭ Chih Wu Pu; Seed Plant Division)

Normally *reproducing by seeds* which contain an embryo, or young plant. (Greek: *sperma*, seed; and *phyton*, plant.)

A. GYMNOSPERMAE Gymnosperms 裸子植物門 (Lo Tzŭ Chih Wu Mên; Naked-seed Plant Subdivision)

Trees and shrubs in which the *seeds* are not enclosed in an ovary, but are *borne exposed on the ovulate scales* (sporophylls). (Greek: *gymnos*, naked; and *sperma*, seed.)

26. CYCADACEAE Cycas Family 蘇鉄科 (Su T'ieh K'o)

Palm-like plants with *pinnately compound lvs.* which are circinate, unfolding like those of a fern: stamens and seeds borne terminally in cones or crown-like clusters. 9 genera and about 85 species, representing a much larger number of earlier geologic ages; now remaining in tropical and subtropical regions; one genus with 2 or 3 species in China.

1. **Cycas** Linn. 蘇鉄属 (Su T'ieh Shu)

Dioecious plants with lvs. pinnately divided into narrow segments: *lfts. with midrib and circinate vernation*: staminate infl. an erect terminal cone; the ovulate a spreading cluster of seed-bearing lvs. About 16 species, in tropical Asia, Australia and Polynesia; 2 or 3 cultivated in China. (The Greek name for a palm tree.)

1. **Cycas revoluta** Thunb. 蘇鉄 (Su T'ieh; Reviving Iron) (B.M. 98). Tree to 3 m.; fls. VII. Japan, Formosa, southern China; locally in Ku. Often planted as an ornamental. Fig. 31.

27. GINKGOACEAE Ginkgo Family 銀杏科 (Yin Hsing K'o)

A large ultimately deliquescent tree with *fan-shaped parallel-veined deciduous lvs.*: dioecious: stamens in catkin-like strobili; the ovules on long stalks and usually in pairs: the drupe-like seed with a fleshy outer coat and a bony inner one. One genus, in China and Japan, but not now known to occur wild.

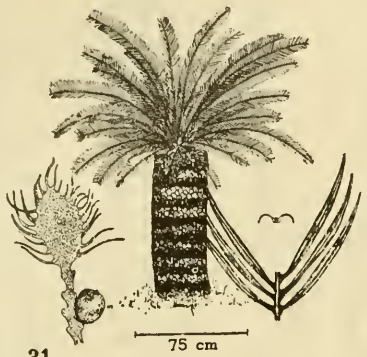
1. **Ginkgo** Linn. 銀杏属 (Yin Hsing Shu)

Characters of the family. One species. (Ginkgo: the Japanese pronunciation of the Chinese name.)

1. **Ginkgo biloba** Linn. Maidenhair Tree 銀杏 (Yin Hsing; Silver Apricot. 白果 Pai Kuo; White Fruit) (R.M.1). Tree, to 40 m.; fls. IV; fr. yellowish, plum-like, VIII. Eastern Asia; locally in An., Che., Ki., Ku. Ornamental shade tree. Fig. 32.

28. TAXACEAE Yew Family 紫杉科 (Tzŭ Shan K'o)

Trees or shrubs with *resinous bark and needle- or scale-like evergreen lvs.*: stamens solitary, or in small axillary spikes; ovules scattered, terminal, surrounded by imbricated scales: fr. berry-or drupe-like; the seed bony-coated, partly or entirely



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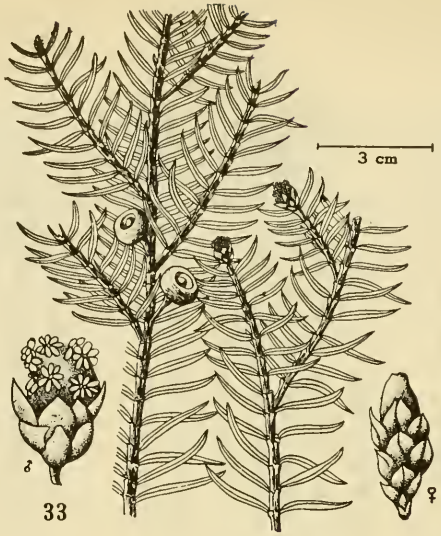

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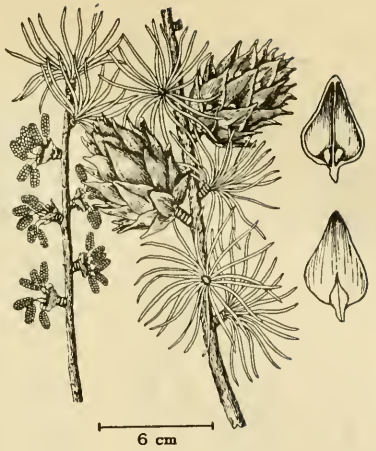

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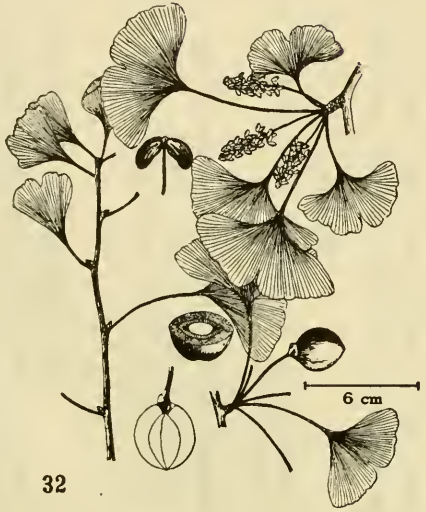

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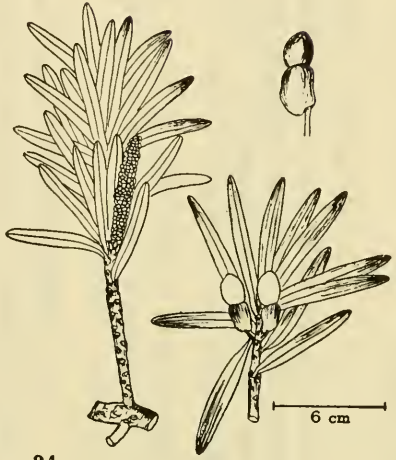

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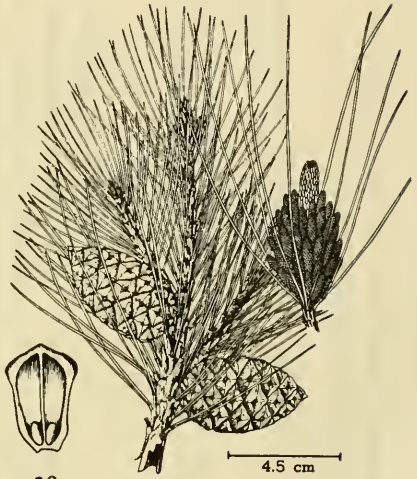

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31. Cycas revoluta
32. Ginkgo biloba

33. Taxus chinensis
34. Podocarpus macrophylla var.

35. Pseudolarix amabilis
36. Pinus massoniana

surrounded by a *fleshy aril* which is often brightly colored. 3 genera with about 15 species, widely distributed; 2 genera with 4 or 5 species in China.

KEY TO THE GENERA

Seed surrounded by a scarlet fleshy cup-shaped aril, not covered at the tip; endosperm smooth: stamens globular ..... 1. *Taxus*
Seed plum-like, completely covered by a green or purplish aril; endosperm ruminate: stamens oblong ..... 2. *Torreya*

1. **Taxus** Linn. YEW 紫杉属 (Tzŭ Shan Shu; Purple Fir Genus)

Lvs. usually falcate, 2–4 cm. long: the bony *seed partly enclosed* by a red fleshy aril. 8 species, in the northern hemisphere; 2 in China. (The Latin name.)

1. **Taxus chinensis** (Pilger) Rehd. CHINESE YEW 紅豆杉 (Hung Tou Shan; Red Bean Fir) (R.M. 3). Tree, to 15 m.; fls. III; fr. IX. Central and western China; locally in An., Che., Ki., Ku. Moist shaded forest. Fig. 33.

2. **Torreya** Arn. TUMION 榧属 (Fei Shu)

Lvs. with the two glaucous lines beneath narrower than the three green bands: single ovule surrounded by a fleshy aril and a few scales: *seed 3–4 cm. long*: resembling *Cephalotaxus*, but with shorter lvs. 6 species, in North America and eastern Asia; 3 in China. (For John Torrey, 1796–1875, American botanist.)

1. **Torreya grandis** Fortune CHINESE TUMION 榧樹 (Fei Shu) (R.M. 4). Tree, to 25 m.; fr. purplish red, IX; "nut" edible. Eastern China; locally in An., Che. Woodland.

29. **PODOCARPACEAE** PODOCARPUS FAMILY 竹柏科 (Chu Pai K'o)

Trees or shrubs with needle-like (rarely scale-like) or linear to broadly oblong evergreen lvs.: stamens with anthers 2-celled: ovule solitary: fr. drupe-like (ours), a *seed surrounded by a fleshy aril*, often on a fleshy receptacle. 7 genera with over 100 species, in warm regions, mostly of the southern hemisphere; 1 genus and 5 or 6 species in China.

1. **Podocarpus** Pers. YELLOW WOOD 竹柏属 (Chu Pai Shu; Bamboo Cedar Genus). Lvs. lanceolate to linear: seed drupe-like, borne on a *fleshy receptacle*. About 60 species, widely distributed; 6 in China. (Greek: *podos*, foot; and *karpos*, fruit.

KEY TO THE SPECIES

Lvs. linear-lanceolate, obtusish, 4–7 cm. long ..... 1. *P. macrophylla*
Lvs. lanceolate or narrow-lanceolate, long-acuminate, 6–12 cm. long .... 2. *P. neriifolia*

1. **Podocarpus macrophylla** (Thunb.) Lamb. var. **maki** Endl. 羅漢松 (Lo Han Sung; Disciples-of-Buddha Pine) (R.M. 6). Tree, to 20 m.; fls. IV; fr. purple, berry-like, X; lvs. linear. China; locally in An., Che., Ki., Ku. Planted, ornamental. Fig. 34.
2. **Podocarpus neriifolia** D. Don 百日青 (Pai Jih Ch'ing; Green-for-one-hundred days) (Chen 15). Tree, to 20 m.; fls. V. East-central China; locally in An., Ki., Ku. Planted, ornamental.

30. **CEPHALOTAXACEAE** PLUM-YEW FAMILY 三尖杉科 (San Chien Shan K'o)

Trees or shrubs with *opposite brts.* and linear spirally attached *lvs.* arranged in

two ranks, *with 2 whitish stomatiferous bands beneath broader than the 3 green lines*: stamens in axillary short-stalked heads or spikes; anthers 3–celled: ovules in axillary short-stalked pairs: fr. drupe-like. 2 genera with 6 species, in Asia; both genera with 4 species in China.

1. **Cephalotaxus** Sieb. & Zucc. 三尖杉属 (San Chien Shan Shu)

Lvs. with two glaucous bands beneath which are broader than the three green lines: ovules in clusters of several pairs: *seed drupe-like, about 2 cm.* long, ripening the second season. 5 species, in Asia; 3 in China. (Greek: *kephale*, head; and taxus.)

Key to the Species

Lvs. 2-4.5 cm. long, abruptly pointed, in semi-erect ranks ..... 1. *C. drupacea*
Lvs. 5-8 cm. long, gradually tapering to a point, in nearly horizontal spreading ranks ..... 2. *C. fortuni*

1. **Cephalotaxus drupacea** Sieb. & Zucc. var. **sinensis** Rehd. & Wils. 鄂西粗榧 (O Hsi Ts'u Fei; Western Hupeh Coarse Tumion) (R.M.5). Tree, to 10 m.; fls. IV; fr. IX. Central and western China; locally in An., Che., Ki. Forest shade.
2. **Cephalotaxus fortuni** Hook. Fortune's Plum Yew 三尖杉 (San Chien Shan; Three-pointed Fir) (R.M.6). Tree, to 10 m.; fls. IV; fr. IX. Central China; locally in An., Che., Ki., Ku. Moist shaded forest.

31. **PINACEAE** Pine Family 松柏科 (Sung Pai K'o; Pine-Cedar Family)

Resinous excurrent trees or shrubs: lvs. solitary or fascicled, needle-like, mostly evergreen (deciduous in *Larix* and *Pseudolarix*): plants usually monoecious: stamens and ovules in cones; anthers 2-celled; ovulate scales 2-ovuled: *seeds* generally winged and borne *on the scales of woody cones*. 9 genera with about 200 species, widely distributed; 8 genera with 60 species in China.

Key to the Genera

A. Leaves deciduous..... 1. *Pseudolarix*
AA. Leaves evergreen.
B. Leaves fascicled, needle-like.
Leaves 2-5 in each fascicle ..... 2. *Pinus*
Leaves 10 or more in each fascicle, or alternate ..... 3. *Cedrus*
BB. Leaves spirally arranged; scales of fertile cones imbricate, not thickened at the tips.
Cones small, 1.5-2.5 cm. long, without protruding bracts..... 4. *Tsuga*
Cones larger, about 5 cm. long, with sharply-pointed protruding bracts ..... 5. *Pseudotsuga*

1. **Pseudolarix** Gord. Golden Larch 金钱松属 (Chin Ch'ien Sung Shu)

Deciduous tree: lvs. linear, scattered or in whorls on short spurs: cones ovoid, 6–8 cm. long. One species, in eastern China. (Greek: *pseudos*, false; and *larix*.)

1. **Pseudolarix amabilis** (Nels.) Rehd. 金钱松 (Chin Ch'ien Sung; Golden Coin Pine) (R.M.31). Tree, to 40 m.; fls. IV; fr. VIII. Eastern China; locally in An., Che., Ki., Ku. Planted, ornamental. Fig. 35.

2. **Pinus** Linn. Pine 松属 (Sung Shu)

Evergreen trees: lvs. of two kinds, the primary scale-like and deciduous, bearing

in their axils short brts. producing the secondary *lvs. in fascicles* of 2–5, the base of each fascicle being surrounded by sheathing bud scales: ovulate cones bearing two winged seeds on each scale, maturing the second season. About 80 species, throughout the northern hemisphere; 10 or more in China. (The Latin name.)

KEY TO THE SPECIES

a. Lvs. 5 in a fascicle, marked on the inner flattened surface with 3-4 prominent white stomatic bands.
  Cones 9-14 cm. long, indehiscent: lvs. 6-12 cm. long ..... 1. *P. koraiensis*
  Cones 5-10 cm. long, dehiscent: lvs. shorter ..... 2. *P. parviflora*
aa. Lvs. 2 or 3 in a fascicle.
  b. Leaves 3 in a fascicle: new bark chalky white .... 3. *P. bungeana*
  bb. Leaves 2 in a fascicle.
    c. Winter buds brown or brownish red.
      Lvs. slender, bright green: cones deciduous.
        Leaves 5-12 cm. long: branchlets bloomy ..... 4. *P. densiflora*
        Leaves 15-20 cm. long: branchlets not bloomy ..... 5. *P. massoniana*
      Lvs. stout, sometimes 3 in a fascicle: cone persistent for several years..... 6. *P. tabulaeformis*
    cc. Winter buds grayish white: lvs. rigid, deep green ..... 7. *P. thunbergii*

1. **Pinus koraiensis** Sieb. & Zucc. KOREAN PINE 海松 (Hai Sung; Sea Pine) (R.M.37). Tree, to 30 m.; fls. V; fr. IX. Introduced from Japan and Korea; locally in Ku. Planted, woodland.
2. **Pinus parviflora** Sieb. & Zucc. JAPANESE WHITE PINE 日本五鬚松 (Jih Pên Wu Hsü Sung; Japanese Five-needled Pine) (R.M.38). Tree, to 30 m.; fls. IV; fr. IX. Introduced from Japan; locally in Ku. Planted, woodland.
3. **Pinus bungeana** Zucc. LACE-BARK PINE 白皮松 (Pai P'i Sung; White-bark Pine) (R.M.40). Tree, to 30 m.; fls. V; fr. VIII. Introduced from northwest China; locally in Ku. Planted, ornamental.
4. **Pinus densiflora** Sieb. & Zucc. JAPANESE RED PINE 日本赤松 (Jih Pên Ch'ih Sung) (R.M.40). Tree, to 35 m.; fls. IV; fr. IX; brts. orange-yellow, bloomy. Introduced from Japan; locally in Ku. Planted, woodland.
5. **Pinus massoniana** Lamb. MASSON'S PINE 馬尾松 (Ma Wei Sung; Horse Tail Pine) (R.M.41). Tree, to 35 m.; fls. IV; fr. X. Southern and central China; locally in An., Che., Ki., Ku. Woodland. Fig. 36.
6. **Pinus tabulaeformis** Carr. CHINESE PINE 油松 (Yu Sung; Pitch Pine) (R.M.43). Tree, to 25 m.; fls. IV; fr. IX. Northern, central and western China; locally in An., Ki. Mountain slopes above 1,000 m.
7. **Pinus thunbergii** Parl. JAPANESE BLACK PINE 日本黑松 (Jih Pên Hei Sung) (R.M.43). Tree, to 30 m.; fls. IV; fr. IX. Introduced from Japan; locally in Ku. Planted, woodland.

3. **Cedrus** Trew CEDAR 雪松属 (Hsüeh Sung Shu)

Lvs. linear, stiff and sharp-pointed, evergreen, scattered or *in fascicles of more than 10*: the 2-ovuled cone scales subtended by small bracts: cones erect, ovoid to oblong, 7–10 cm. long. 4 species, in Asia and North Africa; one planted in China. (The Greek name.)

1. **Cedrus deodara** (Roxb.) Loud. DEODAR CEDAR 雪松 (Hsüeh Sung; Snow Pine) (R.M.34). Tree, to 50 m.; fls. XII; lvs. densely fascicled on the spurs. Intro-

duced from the Himalayas; locally in Ki., Ku. Planted, ornamental.

4. **Tsuga** Carr. Hemlock 鉄杉属 (T'ieh Shan Shu)

Lvs. linear, flattened, with two white stomatic bands beneath, flexible, blunt or notched at the tip, spirally arranged but appearing in two ranks: *cones small*, ovoid, pendulous on the ends of last year's brs.: cone *scales subtended by small bracts*, bearing two small winged seeds. About 10 species, in north temperate regions; 3 in China. (The Japanese name.)

1. **Tsuga chinensis** (Franch.) Pritz. Chinese Hemlock 鉄杉 (T'ieh Shan; Iron Fir) (R.M.20). Tree, to 50 m.; fr. X; lvs. notched at the apex. Western China; locally in An., Che. Mountain ridges at 1,500 to 3,000 m. elevation. Fig. 37.

5. **Pseudotsuga** Carr. 黄杉属 (Huang Shan Shu)

Lvs. similar to *Tsuga*: *cones larger*, about 5 cm. long: *bracts exserted*, with long sharp points. 5 species, in eastern Asia and western North America; 2 in China. (Greek: *pseudos*, false; and *Tsuga*.)

1. **Pseudotsuga sinensis** Dode 黄杉 (Huang Shan; Yellow Fir) (R.M.19). Tree, to 30 m.; fr. X. Western and central China; locally in An. Mountain slopes, over 1,000 m. Fig. 38.

32. **TAXODIACEAE** Taxodium Family 杉木科 (Shan Mu K'o)

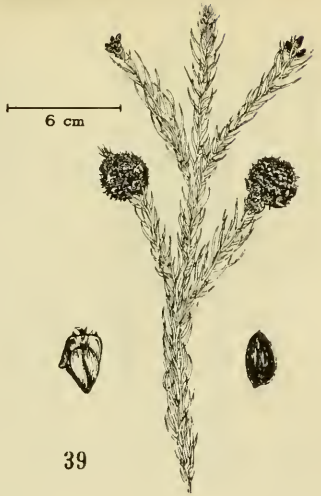
Resinous monoecious trees with *spirally arranged or opposite*, *mostly needle-like*, occasionally acicular or scale-like deciduous or evergreen *lvs. which appear in* two ranks: stamens and ovules in cones; anthers several-celled; cone scales bearing 2–9 ovules: frtg. cones mostly woody; scales often peltate, without distinct bracts; *seeds with* narrow *wing-like borders*. 8 genera with 15 species, widely distributed; 7 genera and a dozen species native to or planted in China.

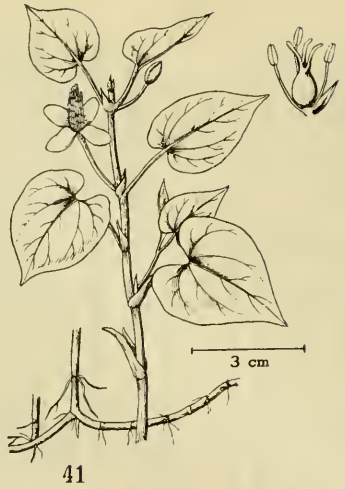
Key to the Genera

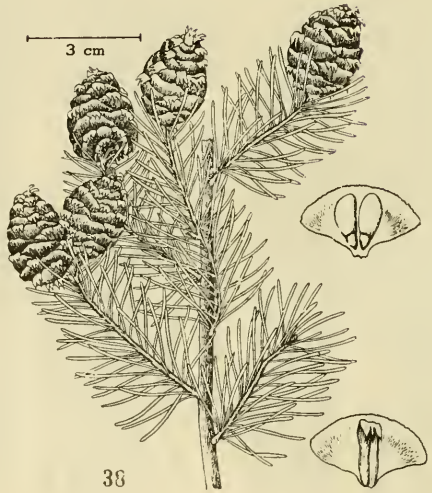
A. Frtg. cone-scales woody, peltate or wedge-shaped.
  B. Deciduous.
    Lvs. decussate, flat and linear, becoming distichous and appearing 2-ranked: seeds 5–9 under each scale of the frtg. cone: staminate cones borne singly in the lf. axils on slender modified drooping brs ..... 1. *Metasequoia*
    Lvs. spirally arranged, often appearing in 2 ranks.
      Staminate cones in drooping panicled leafless spikes ..... 2. *Taxodium*
      Staminate cones solitary, on tips of lfy. brs ..... 3. *Glyptostrobus*
  BB. Evergreen: seeds 2–5 under each scale of the frtg. cone: staminate cones in clusters terminating lfy. brs.: lvs. subulate, stiff, spirally arranged..... 4. *Cryptomeria*
AA. Frtg. cone scales chartaceous, imbricated, sharp-pointed; seeds 3 under each scale: staminate cones in a cluster at tip of lfy. br.: lvs. flat, stiff and sharp-pointed, evergreen ..... 5. *Cunninghamia*

1. **Metasequoia** sensu Hu & Cheng 水杉属 (Shui Shan Shu)

Excurrent trees, the *deciduous decussate linear lvs.* with blunt or obtuse tips: lvs. quickly becoming distichous by the twisting of decurrent basal portion of the leaves and the axis to which they are attached; *staminate cones* borne singly *in the*







37. Tsuga chinensis
38. Pseudotsuga sinensis

39. Cryptomeria japonica
40. Thuja orientalis

41. Houttuynia cordata
42 Saururus chinensia

widely-spaced lf. axils of slender drooping brs.: ovulate cones solitary and terminating slender pendulous lfy. brs., subquadrangular-globose, 16–23 mm. in diameter, with woody peltate scales: *each scale bearing 5–9* compressed *seeds* which are winged all around. One species, native to western China. (Greek: *meta*, after; and *Sequoia*.)

1. **Metasequoia glyptostroboides** Hu & Cheng 水杉 (Shui Shan; Water Fir) (Fa. B. n.s. 1:154). Tree, to 35 m.; fls. II; fr. IX–X. Staminate cones axillary and solitary. Introduced from western China; locally in Ku. Planted.

2. **Taxodium** Rich. 落羽松属 (Lo Yü Sung Shu)

Deciduous or evergreen trees: lvs. alternate, often appearing distichous, subulate or flat and linear, with two stomatic bands beneath: *staminate cones in drooping panicled leafless spikes*: ovulate cones scattered, near the ends of the brs. of the preceding year: frtg. cones globose or ovoid, short-stalked, ripening the first season, consisting of many thick coriaceous peltate scales; each fertile scale with two 3-angled winged seeds. 3 species, in eastern United States and Mexico; 2 planted in China. (Greek term meaning "similar to *Taxus*.")

Key to the Species

Lvs. subulate, appressed: branchlets upright	1. *T. ascendens*
Lvs. linear, spreading, distichous: branchlets horizontal	2. *T. distichum*

1. **Taxodium ascendens** Brongn. Pond Cypress 池柏 (Ch'ih Po) (R.M.49). Tree, to 25 m.; fls. IV; fr. VIII. Introduced from southeastern United States; locally in Ku. Planted.
2. **Taxodium distichum** (L.) Rich. Bald Cypress 落羽松 (Lo Yü Sung; Falling-feathers Pine) (R.M.49). Tree, to 50 m.; fls. IV; fr. VII. Introduced from southeastern United States; locally in Ku. Planted.

3. **Glyptostrobus** Endl. 水松属 (Shui Sung Shu)

Tree with deciduous lateral brts. and foliage lvs. dimorphic, slender needles on the sterile brs. and scale-like to acicular on the frtg. brs.: *staminate cones solitary on the tips of lfy. brs.*; anthers 3–4-celled: frtg. cones tapering to a narrow base, with slender wedge-shaped scales, bearing *2 seeds under each scale*. One species, in South China. (Greek: *glyptos*, carved; and *strobil*, cone.)

1. **Glyptostrobus pensilis** (Staunt.) K. Koch Chinese Deciduous Cypress 水松 (Shui Sung; Water Pine) (Lee 78). Tree, to 5 m.; fls. I; fr. XI. South China; locally in Che., Ki., Ku. Planted, ornamental.

4. **Cryptomeria** D. Don Japanese Fir 柳杉属 (Liu Shan Shu)

Lvs. awl-shaped, stiff, spirally arranged around and *pointing towards the tips of the drooping brts.*: cones globose, with woody wedge-shaped scales each bearing a mucro and 3–5 stiff-pointed processes: bracts with sharp recurved tips: seeds narrowly winged, 2–5 on each scale. One species, in China and Japan. (Greek: *kryptos*, hidden; and *meros*, part.)

1. **Cryptomeria japonica** (L.f.) D. Don 柳杉 (Liu Shan; Willow Fir) (R.M.50). Tree, to 50 m.; fls. III; fr. X–XI; cones clustered. Japan and China; locally in An., Che., Ki., Ku. Often planted. Fig. 39.

5. **Cunninghamia** R. Br. Chinese Fir 杉木属 (Shan Mu Shu)

Evergreen trees with whorled spreading brs. and foliage resembling that of *Araucaria*: *lvs.* linear-lanceolate, serrulate, *stiff and sharp-pointed*, with 2 broad white bands beneath, spirally arranged but appearing in 2 ranks: staminate cones oblong, in small terminal clusters; *pistillate cones* subglobose, *with coriaceous scales*, *each* scale *bearing 3* narrowly-winged *seeds*. Two species, in eastern Asia. (After James Cunningham who discovered our species in 1702.)

1. **Cunninghamia lanceolata** (Lamb.) Hook. 杉木 (Shan Mu; Fir Tree) (R.M. 51). Pyramidal tree, to 25 m.; sprouting from roots and stump if cut back. Important timber tree of central and southern China.

33. **CUPRESSACEAE** Cypress Family 柏木科 (Pai Mu K'o)

Resinous monoecious or dioecious evergreen trees or shrubs with opposite or whorled *usually scale-like decurrent lvs.*: staminate and ovulate cones small, terminal or axillary; anthers 2–6–celled; ovulate scales with 1–many ovules: frtg. cones woody, chartaceous or berry-like, with peltate, wedgeshaped or imbricated scales: *seeds without wings*, 2–5 under each fertile cone scale. 15 genera with 125 species, widely distributed; 6 genera and 30 species in China.

Key to the Genera

A. Frtg. cones woody or chartaceous, not berry like.
  Cones oblong, maturing in one season; scales imbricated: brts. flattened ..... 1. *Thuja*
  Cones nearly glabrous; scales peltate.
    Cones maturing in one season; seeds 2–5 on each scale: brts. flattened ..... 2. *Chamaecyparis*
    Cones maturing the second season; seeds many under each scale: brts. cylindric or flattened ..... 3. *Cupressus*
AA. Frtg. cones berry-like: lvs. dimorphic, scale-like and acicular: brts. cylindric, not flattened ..... 4. *Juniperus*

1. **Thuja** Linn. Arborvitae 側柏属 (Ts'ê Pai Shu)

Wood aromatic: brts. flattened: *lvs.* opposite, *scale-like*: staminate and ovulate cones very small: frtg. *cones oblong* or ovoid, *with* 8–12 *imbricated scales*, the middle 2 or 3 of which are fertile, each bearing *2–3 thick wingless* (ours) *seeds*. 6 species, in eastern Asia and North America; 2 in China. (The Greek name.)

1. **Thuja orientalis** Linn. Oriental Arborvitae 側柏 (Ts'ê Pai; Sideways Cedar) (R.M.54). Pyramidal or bushy tree, to 20 m.; fls. I; fr. VIII–IX. Northern, central and western China, Korea; locally in An., Ki., Ku. Woodland, often planted. Fig. 40.

2. **Chamaecyparis** Spach 日本扁柏属 (Jih Pên Pien Pai Shu)

Aromatic trees with drooping brs., the lower often reaching the ground: brts. flattened: lvs. scale-like: *cones globose*, *maturing the first season*: *2–5 winged seeds* to each scale. 6 species, in eastern Asia and North America; 2 in China. (Greek: *chamai*, on the ground; and *kyparissos*, cypress.)

1. **Chamaecyparis obtusa** (S. & Z.) Endl. Hinoki Cypress 日本扁柏 (Jih Pên Pien Pai; Japanese Arborvitae) (R.M.58). Tree, to 40 m.; fls. IX; fr. X. Introduced from Japan; locally in Ki., Ku. Planted, ornamental.

3. **Cupressus** Linn. Cypress 柏木属 (Pai Mu Shu)

Aromatic trees: brts. flattened or terete: lvs. opposite, scale-like: *cones globose, with peltate scales, maturing the second year*: *several* narrowly-winged *seeds to each scale*. About 15 species, in warm and temperate regions of the northern hemisphere; 3 in China. (The Latin name.)

Key to the Species

Brts. flattened: cones 8–14 mm. across ..... 1. *C. funebris*
Brts. terete or slightly 4-angled: cones 20–30 mm. across ..... 2. *C. sempervirens*

1. **Cupressus funebris** Endl. Chinese Weeping Cypress 柏木 (Pai Mu; Cedar Tree) (B.M.121). Tree, to 20 m.; fls. I; fr, X; brts. drooping. China; locally in Che., Ku. Planted, ornamental.
2. **Cupressus sempervirens** Linn. Italian Cypress 意大利柏木 (I Ta Li Pai Mu) (R.M.56). Tree, to 25 m.; fls. III; fr. X. Introduced from southern Europe and western Asia; locally in Ku. Planted, ornamental.

4. **Juniperus** Linn. Juniper 圓柏属 (Yüan Pai Shu)

Lvs. awl-shaped or scale-like, acicular on young plants, in some species always so: usually *dioecious*: *cones berry-like*, formed by the fused fleshy cone scales. About 40 species, throughout the northern hemisphere; 23 in China. (The Latin name.)

Key to the Species

a. Lvs. all acicular.
  Trees.
    Brs. pendulous: lvs. abruptly pointed, the white bands separated by a green midrib beneath ..... 1. *J. formosana*
    Brs. ascending: lvs. tapering to a slender point, strongly keeled, with one narrow white band below ..... 2. *J. rigida*
  Prostrate shrubs: brs. turning upward at the ends: lvs. slenderly pointed, with white bands confluent or only separated near the base by a green midrib..... 3. *J. procumbens*
aa. Lvs. of two kinds; the juvenile awl-shaped, the adult scale-like.
  A tree: acicular lvs. often ternate: fr. brownish, erect ..... 4. *J. chinensis*
  A shrub, often spreading: acicular lvs. opposite: fr. bluish, pendulous ..... 5. *J. sabina*

1. **Juniperus formosana** Hayata Formosan Juniper 刺松 (Tz'ŭ Sung; Thorny Pine) (R.M.61). Tree, to 12 m.; fls. IV; fr. X. Formosa, China; locally in An., Che., Ki., Ku. Planted, ornamental.
2. **Juniperus rigida** Sieb. & Zucc. Needle Juniper (R.M.62). Tree, to 10 m.; fr. VII. Japan, Korea, North China; locally in An., Ku. Planted, ornamental.
3. **Juniperus procumbens** (Endl.) Sieb. & Zucc. 偃柏 (Yen Pai; Creeping Cedar) (R.M.63). Spreading shrub; fr. IX–X. Introduced from Japan; locally in Ku. Planted, ornamental.
4. **Juniperus chinensis** Linn. Chinese Juniper 圓柏 (Yüan Pai: Round Cedar) (R.M.65). Tree, to 20 m.; fls. II; fr. X. China, Japan; locally in An., Che., Ki, Ku. Woodland, often planted.

4a. **Juniperus chinensis** var. **kaizuca** Hort. 龍柏 (Lung Pai; Dragon Cedar) (Chen 66). Tree of cylindrical form; fr. blue, glaucous; crown erect, cylindrical. Introduced from Japan; locally in Ku. Planted, ornamental.

5. **Juniperus sabina** Linn. Savin 新疆圓柏 (Hsin Chiang Yüan Pai; Sinkiang Juniper)

(R.M.67). Low spreading shrub; fr. IX. Introduced from southwestern and central Europe to Siberia; locally in Ku. Planted, ornamental.

B. ANGIOSPERMAE Angiosperms 被子植物門 (Pei Tzŭ Chih Wu Mên; Enclosed-seed Plant Subdivision)

Flowering plants: seeds enclosed in an ovary which at maturity becomes the fruit.

a. DICOTYLEDONEAE Dicotyledons 雙子葉植物綱 (Shuan Tzŭ Yeh Chih Wu Kang; Pair-seed-leaf Plant Class)

Embryo of the seed with *two cotyledons*: *leaves* usually *net-veined*: *parts of the flowers* mostly *in whorls of 4 or 5*: stems showing a clear distinction of bark, wood and pith; the wood forming annual layers.

(1) ARCHICHLAMYDEAE (Choripetalae, Polypetalae) 古生花被區 (Ku Shêng Hua Pei Ch'ü; Archaic-perianth Subclass)

Perianth none, or of a single whorl, or if of two whorls, the inner (corolla) of separate petals.

♯. MONOCHLAMYDEAE (Apetalae) 单被花類 (Tan Pei Hua Lei; Single-perianth Flower Group)

Perianth wanting, or of a single whorl regarded as the calyx.

34. SAURURACEAE Lizard's Tail Family 三白草科 (San Pai Ts'ao K'o)

Erect perennial herbs with *alternate* cordate petiolate *lvs.*, growing in marshy places: infl. subtended by one or more *showy white bracts*: *fls.* bisexual, *without perianth*, in spikes: stamens 3–7: carpels 3–4, united: fr. a capsule or berry. 3 genera with 4 species, 2 in eastern Asia and 2 in North America; 2 genera with 2 species in China.

Key to the Genera

Flg. spike subtended by an involucre of 4–6 cream-colored petaloid bracts 1. *Houttuynia*
Flg. spikes without petaloid involucre, but with the subtending lf. often variegated, or white, or cream-colored..... 2. *Saururus*

1. **Houttuynia** Thunb. 蕺菜屬 (Ch'i Ts'ai Shu)

Lvs. with *sheathing stipules*: fls. in dense terminal *spikes subtended by a petaloid involucre* of 4–6 cream-colored bracts: stamens 3: carpels 3. One species, in eastern Asia. (Named in honor of the Dutch physician and botanist, Houttuyn,)

1. **Houttuynia cordata** Thunb. 蕺菜 (Ch'i Ts'ai) (Mak. F. 678). Erect herb, 1–10 dm. high; fls. white, VI–VIII; lvs. medicinal. Eastern Asia; locally in An., Che., Hon., Ki., Ku. Marshy places. The name 猪屁股 (Chu P'i Ku; Pig Thigh) is applied to this herb in many Chinese markets where it is sold as a potherb. Fig. 41.

2. **Saururus** Linn. Lizard's Tail 三白草屬 (San Pai Ts'ao Shu)

Lvs. *without evident stipules*: fls. crowded in slender terminal peduncled *spikes*: *subtended by white or variegated lvs.*: stamens 6–7. 2 species, one in eastern Asia and one in eastern North America. (Greek: *saures*, a lizard; and *oura*, tail, referring to the appearance of the flg. spikes.)

1. **Saururus chinensis** (Lour.) Baill. 三白草 (San Pai Ts'ao; Three-white Herb, referring to three parts of the plant: the rhizome, the bracts, and the fls.) (Mak. F. 678). Erect herb, to 1 m.; fls. creamy white, VI; upper lvs. yellowish white. Japan, China, the Philippines; locally in An., Che., Hup., Ku. Along ditches and stream banks. Fig. 42.

35. CHLORANTHACEAE Chloranthus Family 金粟蘭科 (Chin Su Lan K'o)

Woody or herbaceous plants with *opposite lvs.*: infl. without showy bracts: fls. bisexual (ours) or unisexual, without perianth, in spikes: *stamens 1–3*, united to the 1-celled ovary: *fr. a drupe.* 2 principal genera, one in eastern Asia and one in tropical America, including about 35 species; 10 in China.

1. Chloranthus Sw. 金粟蘭屬 (Chin Su Lan Shu)

Aromatic woody or herbaceous perennials with *bisexual* ebracteate sessile *fls.* in terminal or axillary brg. spikes: anthers usually 3, the central one 2-loculed, the lateral 1-loculed: drupe subglobose, fragile and easily deciduous. About 18 species, in eastern Asia and the East Indies; 10 in China. (Greek: *chloros*, green; and *anthos*, flower; referring to the lack of normal color in the fls.)

Key to the Species

a. Anther 1-2-loculed; connective shorter than the locules: flg. spikes many, axillary and terminal: lvs. 14-17 cm. long..... 1. *C. multistachys*

aa. Anthers 3, the middle one 2-loculed, the lateral ones 1-loculed; connective longer than the locules: infl. terminal: lvs. smaller.

An undershrub: involucre branched: connective broadly ovate, irregularly 5-toothed..... 2. *C. spicatus*

Perennial herbs: infl. simple or bifid: connectives 3-lobed.

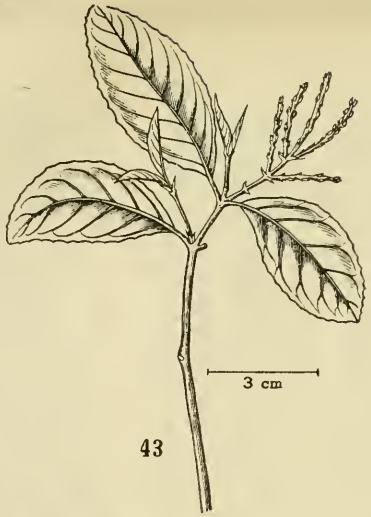
Connective not prominently projected; lobes ovate: drupe pyriform: lvs. acuminate ..... 3. *C. serratus*

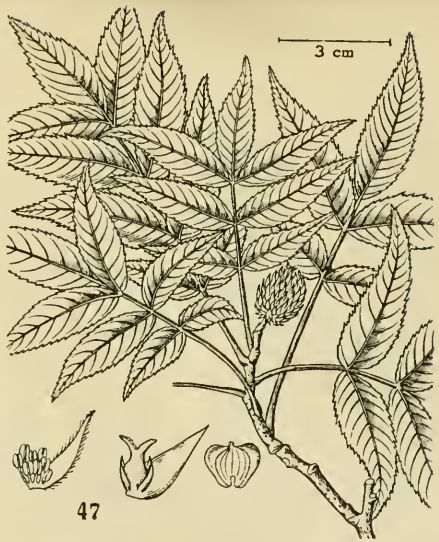
Connective prominently projected into a long erect filament: drupe obovate: lvs. acute at tip..... 4. *C. fortunei*

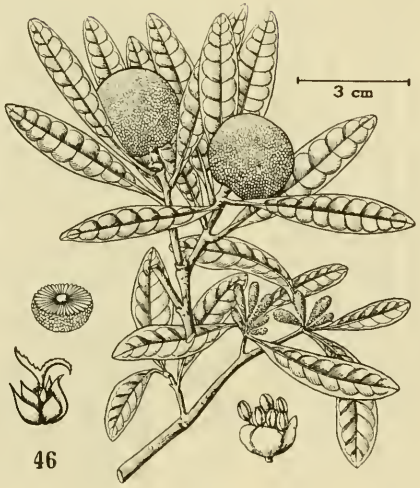
1. **Chloranthus multistachys** P'ei 金粟蘭 (Chin Su Lan; Golden-grain Orchid) (Si.6:681). Herb, to 2 dm.; fls. white, VI–VII; fl. bract oval, scarcely notched at top. China; locally in An., Che., Hup., Ki., Ku. Under dense shade.
2. **Chloranthus spicatus** (Thunb.) Mak. 珠蘭 (Chu Lan; Pearl Orchid) (Mak. F. 677) Shrub, to 1 m.; fls. greenish yellow, VI; fl. bract triangular. China, Japan, locally in Ku. Cultivated for fragrant flowers used to scent tea. Fig. 43.
3. **Chloranthus serratus** (Thunb.) Roem. & Schult. 及己 (Chi Chi) (Mak. F. 676). Herb, 3–5 dm. high; fls. IV–VI, white; fl. bract oval, scarcely notched. China, Japan; locally in An., Che., Ku. Moist ditches.
4. **Chloranthus fortunei** (A. Gray) Solms 銀絲草 (Yin Ssŭ Ts'ao; Silver-thread Herb) (Si.6:684), to 3 dm.; fls. white, IV–VIII; fl. bract 3-cleft. Central China; locally in An., Che., Ki., Ku. Forest floor.

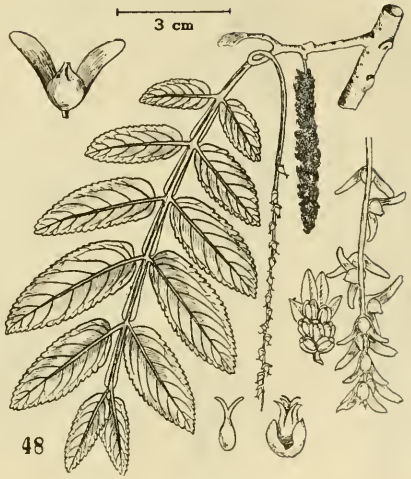
36. SALICACEAE Willow Family 楊柳科 (Yang Liu K'o; Poplar-willow Family)

Deciduous trees or shrubs with soft wood and *alternate simple lvs.*: *dioecious*: *fls. in catkins*, without perianth: fr. a capsule: *seeds* numerous, *hairy-tufted.* 2 genera with over 200 species, common in north temperate regions; about 120 species in China.









43. Chloranthus spicatus
44. Populus tomentosa

45. Salix babylonica
46. Myrica rubra

47. Platycarya strobilacea
48. Pterocarya stenoptera

Key to the Genera

Catkins pendulous; scales laciniate: fls. with a cup-shaped disc at the base: buds with several scales ..... 1. *Populus*

Catkins generally erect; the scales entire: fls. with glands at the base: buds with a single scale ..... 2. *Salix*

1. **Populus** Linn. Poplar 楊属 (Yang Shu)

Trees: lvs. with flattened petioles, mostly ovate or cordate: *buds* resinous, *with several scales*: *catkins pendulous*; the *scales laciniate*: fls. with a cup-shaped disc at the base: stamens 4 or more. About 30 species; 18 in China. (The Latin name.)

Key to the Species

a. Lvs. of the long shoots densely white or grayish tomentose beneath, doubly dentate to sinuately toothed: buds tomentose ..... 1. *P. tomentosa*

aa. Lvs. glabrous or pubescent beneath, or thinly tomentose when unfolding: buds glabrous.

b. Petioles long, distinctly flattened, at least towards the blades; blades broad at the base.

Blades glandular at the base, ciliate on the margin.

Lvs. grayish-pubescent beneath when young, crenate-serrate and sparingly ciliate on the margins: stamens brownish. 2. *P. adenopoda*

Lvs. glabrous, crenate-dentate and densely ciliate on the margins: stamens reddish..... 3. *P. deltoides*

Glands absent at base of blade; margin not ciliate ..... 4. *P. nigra* var. *italica*

bb. Petiole short, 1–2 cm. long, reddish; lvs. broadest above the middle ..... 5. *P. simonii*

1. **Populus tomentosa** Carr. Chinese White Poplar 毛白楊 (Mao Pai Yang; Hairy White Poplar) (R.M.73). Tree, to 10 m.; fls. III–IV. North China; locally in An., Ki., Ku. Commonly planted. Fig. 44.
2. **Populus adenopoda** Maxim. Chinese Aspen 響葉楊 (Hsiang Yeh Yang; Rustling-leaf Poplar) (R.M.74). Tree, to 25 m.; fls. III; fr. IV; lvs. nearly glabrous at maturity. Central and western China; locally in An., Ku. Open woods.
3. **Populus deltoides** Marsh. Cottonwood 美国白楊 (Mei Kuo Pai Yang; American White Poplar) (R.M.81). Tree, to 10 m.; lvs. deltoid. Introduced from eastern North America; locally in Ku. Planted.
4. **Populus nigra** Linn. Black Poplar var. **italica** Koehne Lombardy Poplar 黑楊 (Hei Yang) (R.M.79). Tree, to 15 m.; fls. III; trees of columnar form. Introduced from Europe and western Asia; locally in Ki., Ku. Occasionally planted.
5. **Populus simonii** Carr. 南京白楊 (Nan Chin Pai Yang; Nanking White Poplar) (R.M.76). Tree, to 15 m.; lvs. rhombic-ovate to rhombic-elliptic. Northern China; locally in Ku. Planted, woodland.

2. **Salix** Linn. Willow 柳属 (Liu Shu)

Shrubs or trees: lvs. mostly lanceolate or linear: winter *buds with a single scale*: *catkins* usually *erect*; the scales entire: fls. mostly with 1 or 2 glands at the base; stamens usually 2. About 200 species; 100 in China. (The Latin name.)

Key to the Species

a. Brs. twisted or contorted: planted in gardens, a small tree..... 3a. *S. matsudana* f. *tortuosa*

aa. Brs. straight, not twisted or contorted.
b. Lvs. narrow, linear-lanceolate to oblanceolate.
c. Stamens 3: pistillate fl. with 1 gland: petiole glandular: stipules present, small ..... 1. *S. amygdalina*
cc. Stamens 2: petioles glandless.
d. Staminate fls. with 2 glands: fls. developing with the lvs.
Ovary glabrous.
Tree with long pendulous brs.: stipules wanting... 2. *S. babylonica*
Tree with upright or spreading brs.: stipules lanceolate, often wanting ..... 3. *S. matsudana*
Ovary pubescent: stipules present..... 4. *S. lasiogyne*
dd. Staminate fls. with only 1 gland; fls. before the lvs.: stipules wanting ..... 5. *S. purpurea*
bb. Lvs. broad, elliptic to oblong-lanceolate.
Stipules large, semi-cordate: petioles glandular ..... 6. *S. glandulosa*
Stipules wanting or very small: petioles without glands.
Stamens 2: lvs. glabrous beneath ..... 7. *S. wilsonii*
Stamens 6: lvs. densely brown-hairy on midrib beneath ... 8. *S. mesneyi*

1. **Salix amygdalina** Linn. Almond-leaved Willow 毛柳 (Mao Liu: Hairy Willow) (R.M.93). Shrub or tree, to 10 m.; fls. IV. Eurasia; locally in Ku. Along streams and ditches.
2. **Salix babylonica** Linn. Weeping Willow 水柳 (Shui Liu; Water Willow) (R.M.95). Tree, to 15 m.; fls. greenish yellow, III–IV. China; locally in Ku. Pond margins and ditch banks. Fig. 45.
3. **Salix matsudana** Koidz. 旱柳 (Han Liu; Dry-land Willow) (R.M.94). Tree, to 15 m.; fls. IV. Transbaicalia, North China, Korea; locally in An., Ku. Commonly on dry land in North China.
3a. **Salix matsudana** f. **tortuosa** Rehd. 龍爪柳 (Lung Chua Liu) (R.M.94). Small tree. Northeastern Asia; locally in An., Hun., Hup., Ki., Ku. Planted in gardens.
4. **Salix lasiogyne** Seem. (Lee 182). Tree, to 30 m.; fls. III. Introduced from Japan and Korea; locally in Ku. Planted.
5. **Salix purpurea** Linn. Purple Osier 簸箕柳 (Po Ch'i Liu; Winnowing-basket Willow) (R.M.109). Shrub, to 5 m.; fls. III. Eurasia and North Africa; locally in Ku. Along streams and cultivated for withes used in basketry.
6. **Salix glandulosa** Seem. 河柳 (Ho Liu; River Willow) (Lee 199). Bush or tree, to 6 m.; fls. IV; glands lf.-like. Korea and North China; locally in An., Ku. Along streams.
7. **Salix wilsonii** Seem. 紫柳 (Tzŭ Liu; Purple Willow) (Lee 186). Tree, to 15 m.; fls. IV. China; locally in An., Ki., Ku. Along streams.
8. **Salix mesneyi** Hance (Lee 203). Tree, to 8 m.; fls. III–IV; ovary glabrous. China; locally in Ki., Ku. Moist banks.

37. **MYRICACEAE** Sweet Gale Family 楊梅科 (Yang Mei K'o)

Shrubs or trees with *small scaly buds*: *lvs.* alternate, *simple*, *with resinous dots*: fls. unisexual, without perianth, borne in catkins: *ovary superior*: *fr.* a small drupe or nut, often *coated with resinous* or waxy *grains*. 2 genera and about 35 species, widely distributed; one genus with 4 species in China.

1. **Myrica** Linn. Bayberry 楊梅属 (Yang Mei Shu)

Shrubs or small trees: *lvs. entire or toothed, not pinnatifid*: fr. an edible drupe

(ours), up to 2 cm. in diam., somewhat resembling the strawberry in appearance. About 35 species; 4 in China. (Greek: *murike*, the tamarisk or some other shrub.)

1. **Myrica rubra** Sieb. & Zucc. Strawberry Tree 楊梅 (Yang Mei; Poplar Plum) (Lee 219). Tree, to 12 m.; fls. IV; fr. red, edible, VII. Eastern Asia and Malaya; locally in Che., Ki., Ku. Grown for its fruits. Fig. 46.

38. JUGLANDACEAE Walnut Family 胡桃科 (Hu T'ao K'o)

Aromatic deciduous trees with alternate *pinnately compound lvs.*: *monoecious*: *staminate fls. in* usually drooping *catkins*; the pistillate solitary or in racemes, mostly with a 3–5–lobed perianth or involucre: *ovary inferior*: fr. drupe-like or nut-like, with a large lobed oily *seed*. 6 genera with about 40 species, in north temperate regions; 5 genera and 17 species in China.

Key to the Genera

A. Fr. a winged nutlet.
  Frtg. catkin erect, cone-like: brs. with solid pith ..... 1. *Platycarya*
  Frtg. catkin pendulous: brs. with chambered pith ..... 2. *Pterocarya*
AA. Fr. a drupe or nut, not winged.
  Brs. with chambered pith: fr. a large indehiscent drupe..... 3. *Juglans*
  Brs. with solid pith.
    Fr. a large nut in a woody dehiscent husk ..... 4. *Carya*
    Fr. a nutlet, growing several together in pendulous racemes, each in the axil of a conspicuous 3–lobed bract ..... 5. *Engelhardtia*

1. Platycarya Sieb. & Zucc. 化香樹屬 (Hua Hsiang Shu Shu)

Brs. with small scaly buds and *solid pith*: *both staminate and pistillate fls. in erect catkins*, without perianth; pistillate catkin terminal and solitary, surrounded by several staminate ones: *fr.* a *winged* nutlet, flattened, in the axils of stiff lanceolate bracts which form a small cone. One species, in China. (Greek: *platys*, broad; and *karya*, nut.)

1. **Platycarya strobilacea** Sieb. & Zucc. Black Dye Tree 化香樹 (Hua Hsiang Shu; Yielding-fragrance Tree) (R.M.115). Tree, to 10 m.; fls. white, V–VI; fr. IX; young frs. yield a black dye. China; locally in An., Ki., Ku. Open woods. Fig. 47.

2. Pterocarya Kunth Wing-Nut 楓楊屬 (Fêng Yang Shu)

Brs. with stalked naked buds and *chambered pith*: both staminate and pistillate *fls. in pendulous catkins*, with 1–4–lobed perianth: *fr.* a *winged* nutlet. 8 species, Asiatic; 7 in China. (Greek: *ptero*, wing; and *karya*, nut.)

Key to the Species

Wing of fr. oblong: rachis of lf. winged; lfts. 11–21..... 1. *P. stenoptera*
Wing of fr. circular: rachis not winged; lfts. 7–9..... 2. *P. paliurus*

1. **Pterocarya stenoptera** C. DC. Wing-Nut 楓楊 (Fêng Yang; Maple Poplar) (R.M. 116). Tree, to 30 m.; fls. IV; fr. VII–IX. China; locally in An., Ki., Ku. Along streams, and planted. Fig. 48.
2. **Pterocarya paliurus** Batal. Green Cash Willow 青錢樹 (Ch'ing Ch'ien Liu; Green-Coin Willow) (R.M.116). Tree, to 20 m.; fls. V; fr. VIII. Central China; locally in An., Ki. Open woods.

3. **Juglans** Linn. Walnut 核桃属 (Ho T'ao Shu)

Brs. with scaly buds and *chambered pith*: staminate fls. in drooping catkins; the pistillate in terminal racemes: fls. without perianth, but the pistillate with a 3-lobed involucre: *fr. a large indehiscent drupe* with a deeply lobed edible seed. About 16 species, in America and Eurasia; 3 in China. (The Latin name for *J. regia*, derived from *Jovis glans*, Jupiter's Acorn.)

Key to the Species

Fr. solitary or few, glabrous: lfts. glabrous or nearly so.
Lfts. 7–9, entire: nut with a thin partition ..... 1. *J. regia*
Lfts. 15–23, irregularly serrate: nut with a thick bony partition ..... 2. *J. nigra*
Fr. 6–10, in pendulous racemes, viscid-pubescent:
Lfts. 9–17, pubescent, serrate ..... 3. *J. cathayensis*

1. **Juglans regia** Linn. English Walnut 核桃 (Ho T'ao; Stone Peach) (R.M.117). Tree, to 30 m.; fls. IV; fr. VII–IX. Eurasia; locally in Ku. Grown for its edible nuts. Fig. 49.
2. **Juglans nigra** Linn. Black Walnut 黑核桃 (Hei Ho T'ao) (R.M.118). Tree, to 50 m.; fls. IV; fr. VII–IX. Introduced from eastern North America; locally in Che., Ku. Planted.
3. **Juglans cathayensis** Dode Wild Walnut 野核桃 (Yeh Ho T'ao) (R.M.119). Tree to 25 m.; fls. IV; fr. VII–IX. Central China; locally in An., Ku. Open woods.

4. **Carya** Nutt. Hickory 山核桃属 (Shan Ho T'ao Shu)

Brs. with scaly buds and *solid pith*: staminate fls. in drooping catkins, the pistillate in terminal spikes, with 4-lobed involucre: *fr.* an angled or ovoid nut *in a woody dehiscent husk*: seeds edible. 20 species, in eastern North America, and one in China. (The Greek name for the Walnut Tree.) Fig. 50.

1. **Carya illinoensis** (Wangenh.) K. Koch. (*C. pecan* Engl. & Graebn.) Pecan 美国山核桃 (Mei Kuo Shan Ho T'ao; American Mountain Walnut) (R.M.121). Tree, to 50 m.; fls. V; fr. VIII–X. Husk separating into 4 valves. Introduced from east-central United States and Mexico; locally in Ku. Planted.
   Carya cathayensis Sarg., with fewer lfts. and smaller frts., is found in southern Chekiang and in Kweichow.

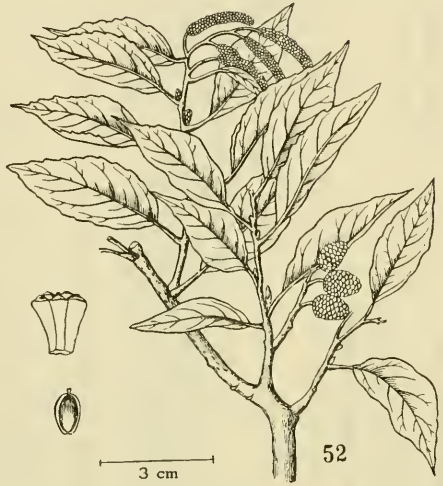
5. **Engelhardtia** Leschen. & Blume 黄杞属 (Huang Ch'i Shu)

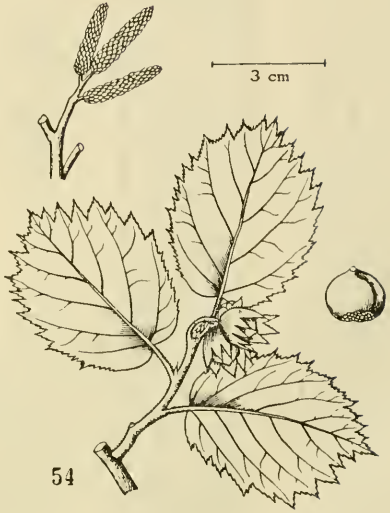
Brs. with *solid pith*: both staminate and pistillate fls. in pendulous spikes; the pistillate with a 4-lobed perianth: *fr. a* globose *nutlet* developing *at the base of a 3-lobed bract*: middle lobe of bract longer than lateral lobes. About 5 species, in eastern Asia; all occurring in China.

1. **Engelhardtia chrysolepis** Hance 黄杞 (Huang Ch'i; Yellow Basket-willow) (Lee 226). Tree, to 20 m.; fls. golden yellow, VI–VII; fr. VIII–IX. Eastern Asia; locally in Che. Open woods. Fig. 51.

39. **BETULACEAE** Hazel Family 桦木科 (Hua Mu K'o)

Deciduous trees or shrubs with alternate *simple lvs.*: fls. appearing before or with the lvs.: staminate *fls.* in catkins; the pistillate *in clusters, spikes, or catkins,* with 2 styles: fr. a 1-seeded nut. 6 genera with over 100 species, in north temperate and arctic regions; all 6 genera and 40 or more species in China.





49. Juglans regia
50. Carya sp.

51. Engelhardtia chrysolepis
52. Alnus japonica

53. Carpinus turczaninowii
54. Corylus heterophylla

Key to the Genera

Nut without leaf-like involucre, small and compressed..... 1. *Alnus*
Nut with a leaf-like involucre.
  Fr. in pendulous spikes ..... 2. *Carpinus*
  Fr. in dense clusters: staminate catkins formed in the autumn..... 3. *Corylus*

1. **Alnus** B. Ehrh. Alder 桤木属 (Ch'i Mu Shu)

Staminate catkins drooping, much longer than the erect pistillate ones: *fr. a* very narrowly *winged nutlet*, developing in the axils of woody persistent scales of *an oblong cone*. 30 species, widely distributed in the northern hemisphere; 7 in China. (The Latin name.)

Key to the Species

Lvs. narrow-elliptic to oblong-lanceolate, without prominent cross-veins between the lateral nerves: frtg. cones 12–15 mm. long ..... 1. *A. japonica*
Lvs. elliptic to obovoid, with cross-veins between the lateral nerves prominent beneath: frtg. cones 20–25 mm. long ..... 2. *A. trabeculosa*

1. **Alnus japonica** Sieb. & Zucc. Japanese Alder 赤楊 (Ch'ih Yang; Red Poplar) (R.M.138). Tree, to 25 m.; fls. II–III; fr. X. Northeastern Asia; locally in Che., Ku. Planted, ornamental. Fig. 52.
2. **Alnus trabeculosa** Hand.-Mazz. (*A. jackii* Hu) (R.M.138). Tree, to 10 m.; fls. II–III; fr. IX–X. China; locally in An., Che., Hun., Ki., Ku. Swampy woodland.

2. **Carpinus** Linn. Hornbeam 千金榆属 (Ch'ien Chin Yü Shu)

Lvs. more or less 2-ranked: both staminate and pistillate catkins pendulous: fr. a ribbed *nutlet in the axil of a large leaf-like bract*. About 20 species in the northern hemisphere; 12 in China. (The Latin name.)

Key to the Species

a. Frtg. bracts densely imbricated, ovate, completely covering the nutlet: lvs. with 15–20 prs. of veins, cordate..... 1. *C. cordata*
aa. Frtg. bracts laxly arranged, oblique, not completely covering the nutlet: lvs. with 10–15 prs. of veins.
  b. Frtg. bracts distinctly lobed at the base, outer margin obtusely toothed.
    Lvs. ovate-oblong to lanceolate: bracts about 5 mm. apart. 2. *C. viminea*
    Lvs. ovate to ovate-oblong: bracts closer.
      Lvs. 4–5 cm. wide: base rounded or nearly cordate ..... 3a. *C. laxiflora* var. *macrostachya*
      Lvs. 2–3 cm. wide; base rounded, obtuse or broadly cuneate. 3b. *C. laxiflora* var. *davidii*
  bb. Frtg. bracts with inner margins not distinctly lobed at the base, slightly inflexed: lvs. ovate ..... 4. *C. turczaninowii*

1. **Carpinus cordata** Blume 千金榆 (Ch'ien Chin Yü; Thousand-coin Elm) (R.M.141). Tree, to 15 m. Northeastern Asia; locally in An. Mixed forest.
2. **Carpinus viminea** Wall. 雷公鬆 (Lei Kung Li; God-of-thunder Oak) (Metc. F. 49). Tree, to 10 m.; fr. VII–IX. Eastern Asia; locally in An., Ki. Mixed forest.
3a. **Carpinus laxiflora** (S. & Z.) Blume var. **macrostachya** Oliv. 細絲鬆 (*C. fargesii* Franch.) (Hsi Ssŭ Li; Fine-grained Oak) (R.M.140). Tree, to 16 m. Central and western China; locally in An., Che., Ki., Ku. Mixed forest.

3b. **Carpinus laxiflora** (S. & Z.) Blume var. **davidii** Franch. 牯嶺鵝耳櫪 (Ku Ling Ê Êrh Li; Kuling Goose-eared Oak) (Chen 170). Shrub, to 7 m. Central China; locally in Ki. Mixed forest.

4. **Carpinus turczaninowii** Hance 鵝耳櫪 (Ê Êrh Li; Goose-eared Oak) (R.M.141). Tree, to 15 m.; fls. III–IV; fr. VII–IX. China, Korea; locally in Ku. Mixed forest. Fig. 53.

3. **Corylus** Linn. Hazelnut 榛屬 (Chên Shu)

Lvs. usually ovate, doubly serrate, pubescent: fls. without perianth; the staminate in pendulous catkins, exposed during the winter; the pistillate in small dense clusters: *fr. a* woody *nut, surrounded by a lfy. involucre.* About 15 species, in north temperate regions; 4 in China. (The Latin name.)

1. **Corylus heterophylla** Fisch. 榛 (Chên) (R.M.145). Shrub, to 5 m.; fr. VIII–X. Nut edible. Northeastern Asia; locally in An., Ki., Ku. Mixed forest and scrubland. Fig. 54.

40. **FAGACEAE** Beech Family 殼斗科 (K'o Tou K'o)

Trees or shrubs with alternate simple lvs.: monoecious: *staminate fls. in catkins*; the pistillate in spikes, with *3 styles*: *fr. a nut*, partly or wholly enclosed *in a spiny or scaly involucre.* 6 genera with about 600 species, widely distributed; 5 genera and about 100 species in China.

Key to the Genera

A. Staminate fls. in heads, pendulous: nut sharply 3-angled..... 1. *Fagus*
AA. Staminate fls. in slender spikes or catkins: nut rounded or plano-convex.
  B. Staminate fls. in erect spikes.
    Fr. enclosed in a prickly bur.
      Lvs. deciduous: terminal bud wanting: fr. maturing in one season ..... 2. *Castanea*
      Lvs. evergreen: terminal bud present: fr. maturing in two seasons ..... 3. *Castanopsis*
    Fr. partly (rarely wholly) enclosed in a more or less scaly cup. 4. *Lithocarpus*
  BB. Staminate fls. in pendulous catkins: fr. partly enclosed in a scaly cup ..... 5. *Quercus*

1. **Fagus** Linn. Beech 山毛欅屬 (Shan Mao Chü Shu; Mountain Hairy Zelkova Genus)

Deciduous trees with smooth gray bark, elongated buds and serrate straight-veined lvs.: *monoecious*: fls. appearing with the lvs.; *the staminate in pendulous* peduncled *head-like clusters*, subtended by deciduous bracts: the pistillate in peduncled pairs, the pair surrounded by numerous subulate bracts which are joined below to form the 4-lobed involucre: styles 3: *nut triangular.* About 10 species, in north temperate regions; 5 or 6 in China. (Greek: *phagein*, to eat, referring to the edible nuts.)

Key to the Species

Stalk of frtg. involucre slender, 3-6 cm. long; appendages of the involucre all subulate: lvs. 7-12 cm. long ..... 1. *F. longipetiolata*
Stalk of frtg. involucre stout 0.5-1.0 cm. long; appendages very short, of deltoid mucronate scales: lvs. 5-8 cm. long ..... 2. *F. lucida*

1. **Fagus longipetiolata** Seem. (R.M.149). Tree, to 25 m.; fr. IX–X. China; locally in An., Che., Hun., Hup., Ki. Forest.
2. **Fagus lucida** Rehd. & Wils. (R.M.149). Tree, to 10 m.; fr. IX. Central and western China; locally in Hun. Forest.

2. **Castanea** Mill. Chestnut 板栗属 (Pan Li Shu)

Deciduous: terminal bud wanting: *staminate catkins erect*: fr. an edible nut wholly enclosed by a spiny bur. 8 species, in temperate parts of the northern hemisphere; 4 in China. (The Latin name.)

Key to the Species

Nuts usually 2-3 in one involucre, also usually broader than high: lvs. pubescent beneath, or pilose on the veins.
- Lvs. without lepidote glands: nuts 2-3 cm. across: a tree ..... 1. *C. mollissima*
- Lvs. densely covered beneath with lepidote glands: nuts 1-1.5 cm. across: a shrub ..... 2. *C. seguinii*

Nuts solitary, usually higher than broad: lvs. glabrous ..... 3. *C. henryi*

1. **Castanea mollissima** Blume Chinese Chestnut 板栗 (Pan Li) (R.M.150). Tree, to 20 m.; fls. whitish, V–VI. China, Korea; locally in Ki., Ku. Often planted for its edible nuts. Fig. 55.
2. **Castanea seguinii** Dode 茅栗 (Mao Li; Themeda Chestnut) (R.M.151). Shrub or tree, to 10 m.; fls. whitish, VI; fr. X. Eastern and central China; locally in An., Ki., Ku. Brushy slopes.
3. **Castanea henryi** Rehd. & Wils. 錐栗 (Chui Li; Awl-tipped Chestnut) (R.M.152). Tree, to 30 m.; fls. V; fr. VIII. Central and western China; locally in An., Ki., Ku. Woodland.

3. **Castanopsis** Spach 苦儲属 (K'u Chu Shu)

Evergreen: terminal bud present: *staminate catkins erect*: nut ripening the second season: involucre covered with spines, tubercles or transverse ridges. About 30 species, mostly in southern and eastern Asia, one in western North America; 20 in China. (Greek: *kastana*, chestnut; and *opsis*, resemblance.)

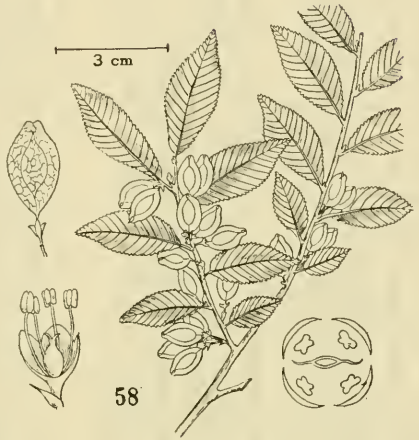
Key to the Species

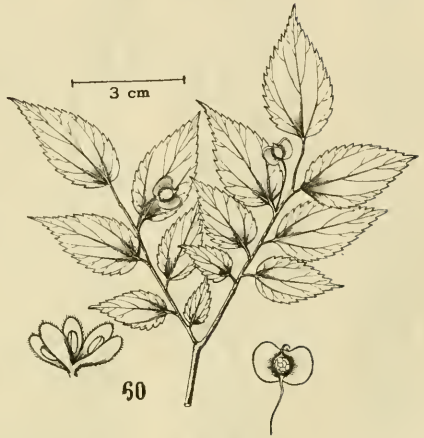
- Involucre not spiny, and not wholly enclosing the nut at maturity .... 1. *C. sclerophylla*
- Involucre spiny, completely enclosing the nut at maturity ..... 2. *C. eyrei*

1. **Castanopsis sclerophylla** Schott Bitter Acorn Tree 苦儲 (K'u Chu; Bitter Castanopsis) (R.M.162). Tree, to 15 m.; fls. V. Eastern and central China; locally in An., Ku. Mixed woods.
2. **Castanopsis eyrei** (Champ.) Tutch. Sweet Acorn Tree 甜儲 (T'ien Chu; Sweet Castanopsis) (Lee 298). Tree, to 20 m. China; locally in An., Ki. Woodland.

4. **Lithocarpus** Blume 石櫟属 (Shih Li Shu)

Evergreen: *staminate catkins erect*: nut partly, sometimes almost wholly, enclosed by a cup-like involucre; the scales often joined into concentric rings. About 100 species, in eastern Asia and western North America; 25 in China. (Greek: *lithos*, stone; and *carpos*, fruit.)





55. Castanea mollissima
56. Lithocarpus glabra

57. Quercus variablis
58. Ulmus parvifolia

59. Hemiptelea davidii
60. Pteroceltis tatarinowii

KEY TO THE SPECIES

Brts. pubescent: lvs. densely gray tomentose beneath, entire or serrate near the tips: acorns ovoid-oblong, partly enclosed by the involucre. 1. *L. glabra*
Brts. glabrous: lvs. thinly tomentose, finally glabrate beneath, entire.
Petiole 1-1.5 cm. long: acorn subglobose, wholly enclosed by the involucre ..... 2. *L. cleistocarpa*
Petiole 1.5-3 cm. long: acorn depressed-globose, 1/3 enclosed by the saucer-shaped involucre ..... 3. *L. henryi*

1. **Lithocarpus glabra** (Thunb.) Rehd. ROCK OAK 石櫟 (Shih Li) (R.M.1st.162). Tree, to 12 m.; fls. white, VIII–IX; fr. X. Eastern China, Japan; locally in An., Che., Ki., Ku. Forest tree. Fig. 56.
2. **Lithocarpus cleistocarpa** (Seem.) Rehd. & Wils. 包櫟樹 (Pao Li Shu; Wrapped-oak Tree) (R.M.1st.162). Tree, to 12 m. fls. V; fr. VIII. Central and western China; locally in An. In woods.
3. **Lithocarpus henryi** (Seem.) Rehd. & Wils. 棉儲 (Mien Chu; Spreading Castanopsis) (R.M.1st.162). Tree, to 15 m.; fls. VII; fr. XI. Central China; locally in An., Che. Open forest.

5. **Quercus** Linn. OAK 櫟屬 (Ma Li Shu)

Deciduous or evergreen trees or shrubs: *staminate catkins pendulous*: nut partly enclosed in a scaly cup-like involucre. Over 200 species, in north temperate regions, and in high altitudes in the tropics; 46 in China. Includes many important timber trees, and some with edible acorns. (The Latin name.)

KEY TO THE SPECIES

a. Lvs. deciduous.
b. Lvs. serrate.
c. Involucre with spreading or recurved scales.
Lvs. white-tomentose beneath when young: bark with thick cork ..... 1. *Q. variabilis*
Lvs. glabrous beneath, or with tufts of hairs in the axils of the veins beneath: cork not so thick ..... 2. *Q. acutissima*
cc. Involucre with appressed scales.
Lvs. oblong-ovate, serrate: acorn ovoid ..... 3. *Q. glandulifera*
Lvs. lanceolate, bristly serrate: acorn cylindrical ..... 4. *Q. chenii*
bb. Lvs. lobed or sinuate-dentate.
d. Brts. glabrous: lvs. with 10-15 prs. of obtuse teeth.
Lvs. crowded at the ends of the brts.: acorn depressed-globose; involucre with spreading scales ..... 5. *Q. stewardii*
Lvs. not crowded: acorn ovoid to cylindrical; involucre with appressed scales.
Lvs. sessile or subsessile: acorn cylindrical ..... 6. *Q. fabri*
Lvs. with petioles 1-2.5 cm. long: acorn ovoid to ovoid-oblong ..... 7. *Q. aliena*
dd. Brts. pubescent: lvs. with 4-9 prs. of broad rounded lobes; involucre with spreading scales ..... 8. *Q. dentata*
aa. Lvs. evergreen.
Frtg. cup of concentric rings: lvs. 7-12 cm. long, acuminate, glaucous or glaucescent beneath.
Lvs. elliptic-oblong to ovate-oblong, serrate towards the tip, silky-pubescent beneath when young ..... 9. *Q. glauca*

Lvs. lanceolate to oblong-lanceolate, serrate glabrous, tending to darken in drying..... 10. *Q. myrsinaefolia*
Frtg. cup of appressed scales: lvs. 2.5–5 cm. long, serrate, acute or obtuse at tip ..... 11. *Q. phillyreoides*

1. **Quercus variabilis** Blume 栓皮櫟 (Shuan P'i Li; Cork Bark Oak) (R.M.160). Tree, to 25 m.; fls. V; fr. VII. North China, Korea, Japan; locally in An., Che., Hup., Ki., Ku. Woodland. Fig. 57.
2. **Quercus acutissima** Carruth. (*Q. serrata* S. & Z.) 麻櫟 (Ma Li; Fibrous Oak) (R.M.160). Tree, to 15 m.; fls. IV–V; fr. VIII–IX. Eastern Asia; locally in An., Che., Ki., Ku. Forest tree.
3. **Quercus glandulifera** Blume (*Q. serrata* Thunb.) 枹樹 (Pao Shu; Drum-stick Tree) (R.M.173). Shrub or tree, to 15 m.; fls. IV; fr. VIII–IX. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Brushland and woodland.
4. **Quercus chenii** Nakai 小葉櫟 (Hsiao Yeh Li; Small-leaved Oak) (Lee 351). Tree, to 20 m.; fls. IV; fr. IX–X. China; locally in An., Che., Ki. Woodland.
5. **Quercus stewardii** Rehd. (Lee 377). Shrub or tree, to 10 m.; fr. IX. East-central China; locally in An. Mountain brushland.
6. **Quercus fabri** Hance White Oak 白櫟 (Pai Li) (R.M.173). Tree, to 15 m.; fls. IV; fr. IX. China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
7. **Quercus aliena** Blume 槲櫟 (Hu Li) (R.M.173). Tree, to 20 m.; fls. IV; fr. VIII–IX. Central China; locally in An., Che., Ki., Ku. Woodland.
8. **Quercus dentata** Thunb. 槲樹 (Hu Shu) (R.M.173). Tree, to 25 m.; fls. IV; fr. X. Japan, Korea, China; locally in An., Ki. Mixed woods.
9. **Quercus glauca** Thunb. Hard Evergreen Oak 青剛櫟 (Ch'ing Kang Li) (R.M.1st 165). Tree, to 15 m.; fls. IV; fr. X. Japan, China, The Himalayas; locally in An., Ki., Ku. Forest tree.
10. **Quercus myrsinaefolia** Blume Evergreen Oak 青栲 (Ch'ing K'ao) (R.M.155.) Tree, to 18 m.; fls. IV; fr. X. Japan, China; locally in An., Che., Ku. Forest tree.
11. **Quercus phillyreoides** A. Gray (R.M.164). Shrub or tree, to 10 m.; fls. IV–V; fr. IX–X. Eastern and central China; locally in Che., Ki. Woodland.

41. **ULMACEAE** Elm Family 榆科 (Yü K'o)

Trees or shrubs *with watery sap*: *lvs.* alternate, usually *oblique* at the base, with deciduous stipules: fls. perfect or monoecious; perianth segments usually more or less united; *style 2-parted*: fr. a samara, nutlet, or drupe. 15 genera with 150 species, widely distributed; 8 genera and 35 species in China.

Key to the Genera

A. Fruit winged.
  Lvs. pinnately-veined.
    Fr. a membranous winged samara: branches not thorny..... 1. *Ulmus*
    Fr. an obliquely-winged nutlet: branches thorny ..... 2. *Hemiptelea*
  Lvs. 3-nerved: fruit a winged nutlet ..... 3. *Pteroceltis*
AA. Fr. a drupe.
  B. Lvs. evergreen, 3-nerved or pinnately-veined ..... 4. *Trema*
  BB. Lvs. deciduous.
    Lvs. pinnately-veined: brs. not thorny: fr. a small oblique drupe, not winged ..... 5. *Zelkova*

Lvs. 3-nerved at the base: fr. a globose drupe.
Veins of the lf. curving inward before the margin: fertile fls. perfect ..... 6. *Celtis*
Veins of the lf. ending in the teeth: fertile fls. unisexual .... 7. *Aphananthe*

1. **Ulmus** Linn. Elm 榆属 (Yü Shu)

Trees with scaly or deeply furrowed bark: lvs. deciduous, pinnately veined: fls. perfect, in the spring before the lvs., or in the autumn: *fr. a* 1-seeded oval *samara*. 18 species, in north temperate regions; 12 in China. (The Latin name.)

Key to the Species

a. Fls. appearing in the spring before the lvs.; calyx lobes short: brts glabrous or nearly so.
Fls. on slender pedicels 1-2 cm. long, drooping: fr. ciliate on the margin: lvs. 7-15 cm. long, unequal at the base ..... 1. *U. americana*
Fls. short-pedicelled, not pendulous: fr. not ciliate.
Lvs. 5-10 cm. long, doubly serrate, unequal at the base: fr. about 2 cm. long, densely pubescent in the notch..... 2. *U. davidiana*
Lvs. 3-5 cm. long, simply serrate, equal at the base: fr. about 1.5 cm. long, glabrous ..... 3. *U. pumila*
aa. Fls. appearing in the autumn in the axils of the lvs.; calyx divided beyond the middle: brts. pubescent: lvs. smaller ..... 4. *U. parvifolia*

1. **Ulmus americana** Linn. American Elm 美国榆 (Mei Kuo Yü) (R.M.175). Tree, to 40 m.; fls. III; fr. V. Introduced from eastern North America; locally in Ku. Planted, ornamental.
2. **Ulmus davidiana** Planch. Black Elm 黑榆 (Hei Yü) (R.M.178). Tree; fls. III; fr. V. Northern and central China; locally in An., Ku. Woodland.
3. **Ulmus pumila** Linn. Siberian Elm 白榆 (Pai Yü; White Elm) (R.M.181). Tree, to 15 m.; fls. II-III; fr. III. Northern and central China, Turkestan; locally in Ki., Ku. Woodland.
4. **Ulmus parvifolia** Jacq. Chinese Elm 椭榆 (Lang Yü) (R.M.181). Tree, to 15 m.; fls. IX; fr. X. Northeastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Woodland. Fig. 58.

2. **Hemiptelea** Planch. 刺榆属 (Tzŭ Yü Shu)

Deciduous tree with *spiny brs.*: lvs. pinnately nerved and serrate: fls. polygamous: *fr. an obliquely-winged nutlet*. One species, in northeastern Asia. (Greek: *hemi*, half; and *ptelea*, the old name for elm; referring to the shape of the winged fr.)

1. **Hemiptelea davidii** (Hance) Planch. 刺榆 (Tzŭ Yü; Thorny Elm) (R.M.182). Shrub, to 5 m.; fls. IV-V; fr. X. Northern and central China, Manchuria, Korea; locally in An., Che., Hun., Ki., Ku. Roadside thickets. Fig. 59.

3. **Pteroceltis** Maxim. 青檀属 (Ch'ing T'an Shu)

Deciduous tree: *lvs. 3-nerved* from the base: fls. monoecious: *fr. a broadly winged nutlet*; wing notched at the apex of the fr. One species, in China. (Greek: *pteron*, wing; and *celtis*; referring to the winged fr. by which it differs from *Celtis*.)

1. **Pteroceltis tatarinowii** Maxim. 青檀 (Ch'ing T'an; Green Dalbergia) (R.M.183). Tree, to 20 m.; fr. VII. Northern and central China; locally in An., Hup., Ku.

Woodland. Fig. 60.

4. **Trema** Lour. 山黃麻屬 (Shan Huang Ma Shu; Mountain Yellow-hemp Genus)

Evergreen: lvs. often 3–nerved at the base: fls. mostly unisexual: *fr. a drupe.* About 30 species, widely distributed in tropical and subtropical regions; 3 in China. (Greek term meaning "a hole", because the drupe has holes.)

1. **Trema dielsiana** Hand.-Mazz. 山油麻 (Shan Yu Ma; Mountain Flax) (Lee 414). Shrub or tree, to 6 m.; fr. IX. China; locally in An., Che., Hun., Hup., Ki. Roadside thickets.

5. **Zelkova** Spach 櫸屬 (Chü Shu)

Deciduous: bark smooth or scaly: lvs. pinnately veined; fls. polygamous: *fr. an oblique drupe.* 4 species, in Asia; 3 in China. (From "Zelkoua" or "Tselkwa", the Caucasian vernacular name.)

Key to the Species

Lvs. densely pubescent beneath: brts. usually pubescent ..... 1. *Z. schneideriana*
Lvs. glabrous at maturity, or with tufts of hairs in the axils of the veins beneath: brts. glabrous or slightly pubescent.
Lvs. small, about 3 cm. long, with tufts of hairs in the axils of the veins beneath: fr. 5–6 mm. across, nearly ovoid ..... 2. *Z. sinica*
Lvs. large, up to 10 cm. long, glabrous at maturity: fr. about 4mm. long, very oblique ..... 3. *Z. serrata*

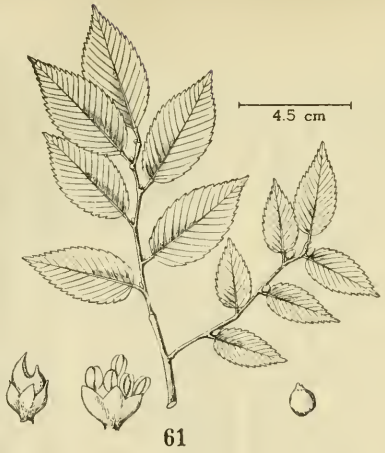
1. **Zelkova schneideriana** Hand.-Mazz. 大葉櫸樹 (Ta Yeh Chü Shu; Large-leaved Zelkova) (R.M.183). Tree, to 20 m.; fls. IV; fr. VIII–XI. China; locally in An., Che., Hup., Ku. Woodland. Fig. 61.
2. **Zelkova sinica** Schneid. 櫸樹 (Chü Shu) (R.M.183). Tree, to 17 m.; fls. IV; fr. IX–X. China; locally in Hon., Hup., Ku. Woodland.
3. **Zelkova serrata** (Thunb.) Mak. 光葉櫸樹 (Kuan Yeh Chü Shu; Glossy-leaved Zelkova) (R.M.183). Tree, to 30 m.; fls. IV; fr. VIII. Japan, China; locally in An., Hun., Ku. Woodland.

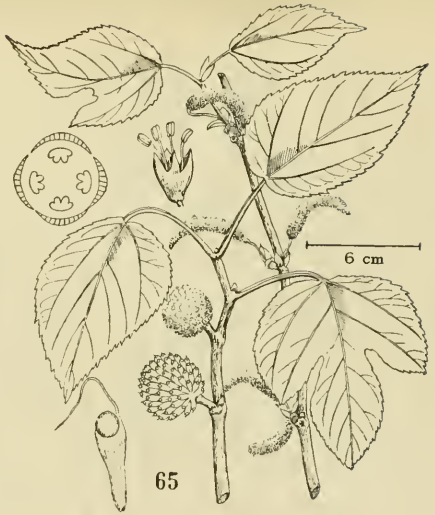
6. **Celtis** Linn. Hackberry 朴屬 (P'o Shu)

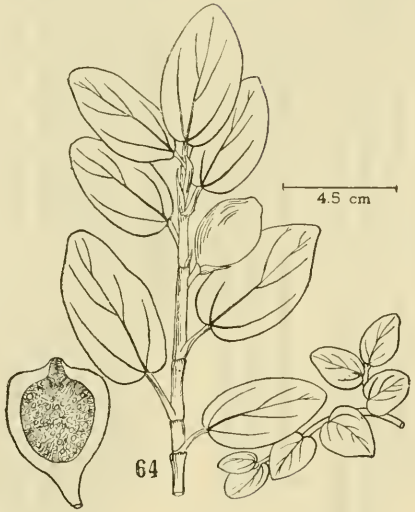
Deciduous (ours): bark smooth: lvs. 3–nerved at the base: *fls.* polygamo-monoecious; *the fertile ones perfect*: *fr. a* subglobose or ovoid *drupe.* 70 species, in north temperate and tropical regions; 20 in China, some of them with edible frs. (From the Latin name of an African species of lotus.)

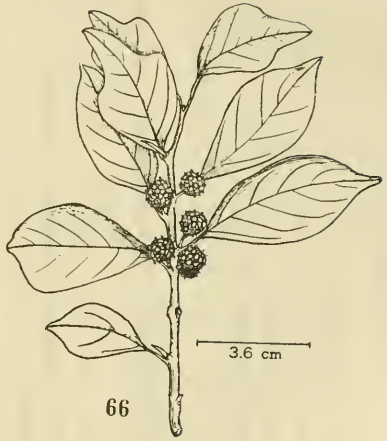
Key to the Species

a. Brts. glabrous: lvs. crenate-serrate, qright green on both sides: fr. solitary, black, 6–7 mm. in diam., on slender stalks longer than the petioles ..... 1. *C. bungeana*
aa. Brts. pubescent: lvs. serrate, sometimes entire: fr. orange or reddish brown.
Lvs. 3–10 cm. long: frs. 5–7 mm. in diam., on slender stalks.
Frs. often 2 or 3 in a cluster, orange; stalk often 3–4 times the subtending petiole ..... 2. *C. biondii*









61. Zelkova schneideriana
62. Celtis sinensis

63. Aphananthe aspera
64. Ficus pumila

65. Broussonetia papyrifera
66. Cudrania tricuspidata

Fr. solitary, reddish brown; peduncle shorter, about as long as the subtending petiole ..... 3. *C. sinensis*
Lvs. 7-14 cm. long: frs. 10-13 mm. in diam., dull orange, solitary on stout stalks 2-3 times the subtending petiole ..... 4. *C. julianae*

1. **Celtis bungeana** Blume Bunge's Hackberry 黑弹樹 (Hei Tan Shu; Black-bullet Tree) (R.M.185). Tree, to 20 m.; fls. IV; fr. black, VII–IX. Central and northern China, Manchuria, Korea; locally in An., Hup., Ku. Woodland.
2. **Celtis biondii** Pampan. 紫弹樹 (Tzŭ Tan Shu; Purple-bullet Tree) (R.M.186). Tree, to 14 m.; fls. IV; fr. orange, VIII–IX. Central China; locally in An., Che., Hup., Ki., Ku. Woodland.
3. **Celtis sinensis** Pers. Chinese Hackberry 朴樹 (P'o Shu) (R.M.186). Tree, to 20 m.; fls. IV; fr. orange, VI–VIII. Eastern China, Korea, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Village tree. Fig. 62.
4. **Celtis julianae** Schneid. (R.M.187). Tree, to 25 m.; fls. IV; fr. orange, IX. Eastern and central China; locally in An., Che., Hup. Forest.

7. **Aphananthe** Planch. 糙葉樹屬 (Ts'ao Yeh Shu Shu)

Deciduous (ours): lvs. 3-nerved at the base: *fls. monoecious*: fr. an ovoid or subglobose drupe. 3 or 4 species, in Asia and Australia; one in China. (Greek: *aphanes*, inconspicuous; and *anthe*, flower.)

1. **Aphananthe aspera** Planch. 糙葉樹 (Ts'ao Yeh Shu; Coarse-leaved Tree) (R.M. 187). Tree, to 40 m.; fls. V; fr. VIII; veins of lf. ending in teeth. Japan, eastern China, Korea; locally in An., Che., Ki., Ku. Temple forests. Fig. 63.

42. **MORACEAE** Mulberry Family 桑科 (Sang K'o)

Deciduous or evergreen trees or shrubs *with milky sap*: fls. small, unisexual; the staminate in catkins; the pistillate usually in spikes or heads, crowded on a variously modified receptacle: *fr. a fleshy syncarp* including many small achenes or drupes. About 55 genera with 1,000 species, mostly tropical; 8 genera and over 100 species in China.

Key to the Genera

A. Fls. enclosed in a fleshy pear-shaped, ovoid or globose receptacle which becomes the fr. ..... 1. *Ficus*
AA. Fls. in a spike or head on the outside of the receptacle.
Brs. not spiny: staminate fls. in catkins: lf. margins serrate.
Fr. a globose syncarp: pistillate fls. in a head-like cluster..... 2. *Broussonetia*
Fr. an oblong syncarp: both staminate and pistillate fls. in spikes 3. *Morus*
Brs. spiny: both staminate and pistillate fls. in head-like clusters: lf. margins entire..... 4. *Cudrania*

1. **Ficus** Linn. Fig 榕樹屬 (Jung Shu Shu; Banyan Tree Genus)

Mostly evergreen trees, shrubs or woody vines: usually monoecious: *fls.* very small, *borne inside a hollow pear-shaped or subglobose receptacle* with a narrow opening: *fr. a fleshy* sometimes edible *receptacle within which numerous seed-like achenes develop.* About 600 species, widely distributed in tropical and subtropical regions; 90 in China. (The Latin name for the fig.)

Key to the Species

a. Lvs. evergreen, leathery, prominently reticulate beneath: plants climbing or trailing.
  Lvs. oblong-lanceolate to lanceolate, acuminate, subcuneate at the base: frtg. receptacle 15 mm. or less long.
    Petioles 10-15 mm. long: lvs. tapering at the tips, but not acuminate: receptacle 8-9 × 13-15 mm. ..... 1. *F. foveolata*
    Petioles 5-8 mm. long: lvs. acuminate: receptacle 6-7 × 7-8 mm. ..... 2. *F. martini*
  Lvs. ovate to oblong, obtuse at the tip and cordate at the base: receptacle 30-35 × 40-55 mm. ..... 3. *F. pumila*

aa. Lvs. deciduous, membranaceous, not prominently reticulate beneath: erect woody plants.
  b. Frtg. receptacles sessile, 2 in each lf. axil, 10-15 mm. across and fleshy at maturity: lvs. lobed or entire, rarely remotely serrate..... 4. *F. heteromorpha*
  bb. Frtg. receptacles stalked, usually solitary in the lf. axils.
    c. Lvs. lobed, margins irregularly dentate: frtg. receptacle on stout stalk, solitary, axillary or subterminal, 5-8 cm. long, fleshy and edible: brs. stout ..... 5. *F. carica*
    cc. Lvs. not lobed; margins sometimes undulate or panduriform, not serrate or dentate.
      Lvs. obovate-elliptic to subrhomboid, 8-15 cm. long, pubescent: frtg. receptacle 13-18 mm. in diam. at maturity, on stout stalk 10-20 mm. long ..... 6. *F. erecta* var. *beecheyana*
      Lvs. ovate or lanceolate, mostly glabrous above.
        Frtg. receptacles many, 6 × 9 mm. at maturity: lvs. oblanceolate to oblong-lanceolate, 5-9 cm. long .. 7. *F. formosana*
        Frtg. receptacles few, 12-15 × 27-30 mm. at maturity: lvs. oblong-lanceolate to narrowly lanceolate 4-8 cm. long ..... 8. *F. pyriformis*

1. **Ficus foveolata** Wall. ex Miq. 珍珠蓮 (Chên Chu Lien; Pearl Lotus) (H.F.5:528). Shrub, to 2 m.; fls. purple, IV; fr. green, IX. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Brushy slopes.
2. **Ficus martini** Levl. & Vant. (*F. baileyii* Hutch.) (B.G.1:19). Woody climber; fls. IV; fr. green, XI. China; locally in An., Che., Hun., Hup., Ki., Ku. Shady woods.
3. **Ficus pumila** Linn. 薜荔 (Pi Li) (Mak.F.648). Woody climber; fls. IV; fr. green, IX. Japan and China; locally in An., Che., Hun., Hup., Ki., Ku. Walls and cliffs. Fig. 64.
4. **Ficus heteromorpha** Hemsl. (H.I.26:2533-4). Shrub, or tree, to 6 m.; fls. greenish, VI; fr. reddish, VIII. Eastern Asia; locally in Che., Hun., Hup., Ki. Forest shade.
5. **Ficus carica** Linn. Fig 無花果 (Wu Hua Kuo; Flowerless Fruit) (R.M.191). Tree, to 10 m.; fr. green or purple, X, edible. Introduced from western Asia; locally in An., Che., Ki., Ku. Planted for fruit.
6. **Ficus erecta** Thunb. var. **beecheyana** (H. & A.) King 天仙果 (T'ien Hsien Kuo; Heavenly-fairy Fruit) (King F.1(2):142). Shrub, to 3 m.; fls. IV; fr. green, X. Eastern Asia; locally in An., Che., Ki., Ku. Brushland.

7. **Ficus formosana** Maxim. (King F.1(2):153). Shrub, to 1 m.; fls. VII–VIII; fr. IX–X. China, Formosa; locally in An., Che., Hun., Ki. Shady moist places.
8. **Ficus pyriformis** Hook. & Arn. (Be.F.328). Shrub, to 2 m.; fls. V–VI; fr. reddish, X–XI. Southeastern Asia; locally in Che., Ki. Thickets.

2. **Broussonetia** Vent. Paper Mulberry 構樹屬 (Kou Shu Shu)

Deciduous *unarmed* trees or shrubs with milky sap: dicecious: *lvs. serrate*, often lobed, sometimes irregularly: staminate fls. in cylindrical rather stiff catkins; the pistillate in globose heads: *fr. a* dense *globose syncarp* of fleshy red drupelets; endocarp crustaceous. 2 species, in eastern Asia. (After T.N.V. Broussonet, a French naturalist, 1761–1807.)

Key to the Species

Petioles 1–2 cm. long; lvs. glabrescent: syncarp 1 cm. across ..... 1. *B. kazinoki*
Petioles 3–10 cm. long; lvs. pubescent: syncarp 2 cm. across..... 2. *B. papyrifera*

1. **Broussonetia kazinoki** Sieb. & Zucc. (*B. kaempferi* Sieb.) 葡蟠 (P'u P'an; Coiling Vine) (R.M.191). Shrub; fls. IV–V; fr. red, VI, slender, prostrate. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
2. **Broussonetia papyrifera** (L.) Vent. Paper Mulberry 構樹 (Kou Shu) (R.M.190). Tree, to 20 m.; fls. IV–V; fr. orange-red, IX; brs. stout, spreading. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Wooded and brushy places. Fig. 65.

3. **Morus** Linn. Mulberry 桑屬 (Sang Shu)

Deciduous *unarmed* trees or *shrubs with milky sap*: dioecious: *lvs. serrate* or dentate, sometimes lobed: staminate fls. in cylindric pendulous catkins; the pistillate in oblong heads: *fr. an oblong syncarp* with white or black fruitlets. About 12 species, in temperate and subtropical parts of the northern hemisphere; 8 in China. Valued for their edible frs. and because the lvs. provide food for silkworms. (The Latin name.)

Key to the Species

Lvs. glabrescent beneath: trees often planted ..... 1. *M. alba*
Lvs. pubescent beneath: trees not often planted.
  Lvs. rather closely serrate; teeth not bristle-tipped; tip of lf. blade not slenderly pointed: stigmas sessile or nearly so ..... 2. *M. cathayana*
  Lvs. coarsely serrate; teeth bristle-tipped; tip of blade with long slender point: stigma borne on an evident style..... 3. *M. mongolica*

1. **Morus alba** Linn. White Mulberry 桑樹 (Sang Shu) (R.M.188). Tree, to 15 m.; fls. IV–V; fr. black, V–VI. China; locally in An., Che., Ki., Ku. Grown for the leaves.
2. **Morus cathayana** Hemsl. 胡藍桑 (Hu Lu Sang; Gourd Mulberry) (R.M.189). Tree, to 10 m.; fls. IV–V; fr. white, red or black, VIII. Central and eastern China; locally in An., Che., Hup. Woodland.
3. **Morus mongolica** Schneid. var. **diabolica** Koidz. 山桑 (Shan Sang; Mountain Mulberry) (R.M.189). Shrub; fls. IV. China, Korea; locally in Ku. Brushland.

4. **Cudrania** Tréc. 柘樹屬 (Chê Shu Shu)

Deciduous or evergreen trees or shrubs with milky sap and often with *thorny brs.*: dioecious: *lvs. entire or 3-lobed*: *fls. in globular heads*: fr. a fleshy globular syncarp. 5 or 6 species, from China to Australia and New Caledonia. (From the Malayan name "Curdang".)

1. **Cudrania tricuspidata** (Carr.) Bur. 柘樹 (Chê Shu) (R.M.191). Shrub or tree, to 10 m.; fls. V; fr. red, X; lvs. on young growth often 3-lobed. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Brushland and woods. Fig. 66.

43. **CANNABINACEAE** Hemp Family 大麻科 (Ta Ma K'o)

Dioecious herbs: *lvs. palmately lobed or compound*: staminate fls. in panicles or racemes; the pistillate in spikes: fr. an achene with crustaceous pericarp. 2 genera with 3 species, in north temperate regions; all occurring or cultivated in China.

Key to the Genera

An erect herb: lvs. palmately compound ..... 1. *Cannabis*
Twining vines: lvs. palmately lobed ..... 2. *Humulus*

1. **Cannabis** Linn. Hemp 大麻屬 (Ta Ma Shu)

Tall *erect* annual: *lvs. digitate*, 5–7-foliolate. One species, in Asia. (The Greek name.)

1. **Cannabis sativa** Linn. Common Hemp 大麻 (Ta Ma; Great Fiber) (B.M. 341). Herb, 1–2 m. high; fls. yellowish, VII. Asia; locally in An., Ku. Cultivated for its bast fiber. Fig. 67.

2. **Humulus** Linn. Hop 葎草屬 (Lü Ts'ao Shu)

Twining vines: *lvs. opposite, palmately lobed*: pistillate spike becoming a cone-like structure. 3 species, in north temperate regions; 2 in China. The frtg. "cone" of *H. lupulus* forms the Hop of commerce. (A Latin name.)

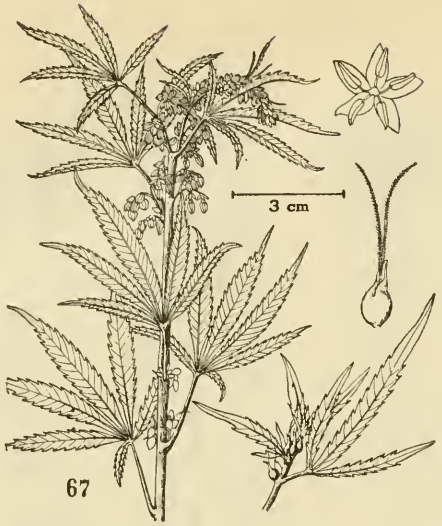
1. **Humulus scandens** (Lour.) Merr. (*H. japonicus* Sieb. & Zucc.) Japanese Hop 葎草 (Lü Ts'ao) (B.M.341). Twining annual; fls. V–VIII; fr. VIII–IX; lvs. rough-hairy. Japan and China; locally in An., Ku. Roadside thickets.

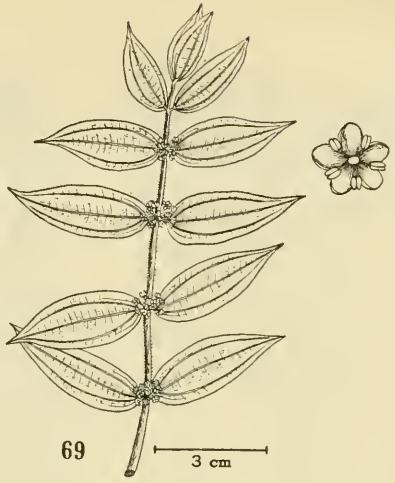
44. **URTICACEAE** Nettle Family 蕁麻科 (T'an Ma K'o)

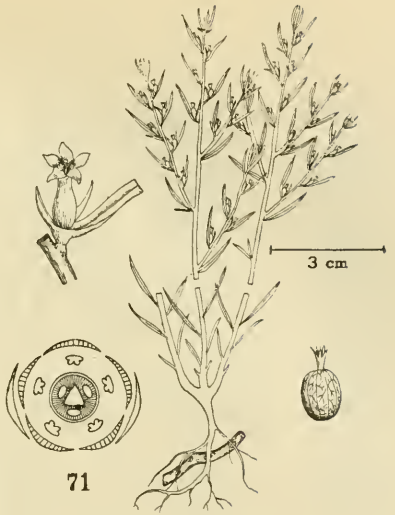
Plants with *watery sap*, sometimes bearing stinging hairs: fls. unisexual (ours): stamens as many as the perianth segments and opposite them: fr. an achene or drupe. Over 40 genera and 500 species, widely distributed, especially in the tropics; about 17 genera and 80 species in China.

Key to the Genera

A. Infl. spicate: stems somewhat woody at the base ..... 1. *Boehmeria*
AA. Infl. in axillary clusters, cymes or panicles: stems definitely herbaceous (suffruticose in *Pilea notata*).
B. Pistillate fls. in sessile axillary clusters: lvs. oblique at the base.
Lvs. alternate, coarsely serrate: staminate fls. in pedunculate clusters ..... 2. *Elatostema*
Lvs. opposite, entire: staminate fls. with the pistillate in axillary clusters; the staminate on longer pedicels ..... 3. *Gonostegia*







67. Cannabis sativa
68. Elatostema stewardii

69. Gonostegia hirta
70. Nanocnide japonica

71. Thesium chinense
72. Schoepfia jasminodora

BB. Pistillate, staminate or bisexual fls. in pedunculate clusters or in panicles: lvs. regular at the base.
Stems and lvs. pubescent; cystoliths oblong: pistillate perianth 4-parted ..... 4. *Nanocnide*
Stems and lvs. glabrous, or nearly so, but with fusiform cystoliths: pistillate perianth 3-parted ..... 5. *Pilea*

1. **Boehmeria** Jacq. False Nettle 苧麻屬 (Chu Ma Shu)

Plants more or less woody below: lvs. 3-nerved at the base: *fls. in* small *pendulous spikes*; tubular perianth enclosing the ovary. About 50 species, in the warmer regions of the world; 8 in China. (After G. R. Boehmer, a German botanist, 1723–1803)

Key to the Species

a. Lvs. alternate, white-tomentose beneath, sparingly pubescent above 1. *B. nivea*
aa. Lvs. opposite, pubescent, never lanate.
Frtg. perigonium uniformly pubescent: plant slender, 4–6 dm. high. 2. *B. spicata*
Frtg. perigonium pubescent at base, densely hispid at apex.
Plant robust, suffruticose, 1–2 m. high: lf. blades thick and leathery ..... 3. *B. longispica*
Plant herbaceous, 0.5–1 m. high: lf. blades thin and papery... 4. *B. platanifolia*

1. **Boehmeria nivea** (L.) Gaudich. Ramie 苧麻 (Chu Ma) (R.M. 192). Suffruticose, 1–2 m. high; fls. VII–VIII; fr. IX–X. Southern and eastern Asia; locally in An., Ki., Ku. Cultivated for its fiber.
2. **Boehmeria spicata** Thunb. 小赤麻 (Hsiao Ch'ih Ma; Small Red Fiber) (Mak. F. 642). Shrub, 3–5 dm. high; fls. reddish, VIII; fr. IX–X; stem and lvs. tinged with red. Japan, China; locally in An., Ki., Che. Damp banks.
3. **Boehmeria longispica** Steud. (*B. japonica* Miq.) 藪苧麻 (Sou Chu Ma; Marsh Boehmeria) (Mak. F. 640). Suffruticose, 1–1.5 m. high; fls. greenish white, VI–VII; fr. X. Japan, China; locally in An., Che., Hon., Ki., Ku. Roadside thickets.
4. **Boehmeria platanifolia** (Maxim.) Franch. & Savat. ex C.H. Wright (Mak. F. 640). Erect herb, to 1 m.; fls. VIII–IX; frs. X–XI. Japan and China; locally in Che., Hup., Ki. Moist woodland.

2. **Elatostema** Forst. 楼梯草屬 (Lou T'i Ts'ao Shu; Stairway-herb Genus)

Herbs: *lvs. alternate*, the *margins serrate* or dentate: *fls. in axillary* unisexual involucrate *clusters*; perianth of pistillate fls. much shorter than the ovary. About 100 species, in tropical and subtropical parts of the Old World; 10 in China. (From the Greek terms meaning "drive", and "filament", referring to the elastic stamens.)

1. **Elatostema stewardii** Merr. (Ph. J. 27:161). Herb, 3–5 dm. high; fls. greenish, VII; lf. base oblique. China; locally in An., Ki., Hup. Moist shade, cliffs and stream beds. Fig. 68.

3. **Gonostegia** Turcz. 霧水葛屬 (Wu Shui Ko Shu; Vine-of-the-mist Genus)

Herbaceous: *lvs. opposite*, the *margins entire*: *fls. in axillary* unisexual *clusters*: top of the ovary jointed and deciduous. About 35 species, mostly in Asia; one in China. (Greek: *gonia*, an angle; and *stege*, a covering; referring to the ovary cover.)

1. **Gonostegia hirta** (Bl.) Miq. 糯米團兒 (No Mi T'uan Êrh; Glutinous Rice Clumps) (Mak. F. 640). Decumbent herb, 2–4 dm. high; fls. VI–VIII; lvs. sessile, 3-nerved,

Southeastern Asia, Australia; locally in An., Che., Ki., Ku., Hup. Brushland. Fig. 69.

4. **Nanocnide** Blume 花点草属 (Hua Tien Ts'ao Shu)

Herbaceous annuals *with stinging hairs*: lvs. alternate: monoecious: fl. clusters cymose, unisexual, solitary in the lf. axils. 2 species, in eastern Asia; one in China. (Latin: *nanus*, dwarf; and Greek: *knide*, nettle.)

1. **Nanocnide japonica** Blume 花点草 (Hua Tien Ts'ao; Flower-dot Herb) (Mak. F. 645). Spreading herb, 1–2 dm. high; fls. IV–V; pistillate perianth 4-parted. China, Japan; locally in An., Ku. Moist shaded places. Fig. 70.

5. **Pilea** Lindl. Richweed 美豆属 (Mei Tou Shu; Beautiful Bean Genus)

Herbs: *lvs. opposite*, usually 3-nerved: *fls. in axillary cymes*; perianth segments of pistillate fls. unequal, the dorsal one longest. 170 species, widely distributed in tropical regions; 20 in China. (Latin: *pileus*, a felt cap of the Romans, referring to a characteristic of the fls. in the original species.)

Key to the Species

Slender herb, 5–15 cm. high: lvs. entire or faintly serrate ..... 1. *P. henryana*
Robust plants, woody at the base, 50–60 cm. high: lvs coarsely serrate and with long slender tips.
  Terminal lobe of lf. straight, 8–12 mm. long ..... 2. *P. hamaoi*
  Terminal lobe of lf. falcate, 15–30 mm. long ..... 3. *P. notata*

1. **Pilea henryana** C.H. Wright (B.G. 1:20). Herb, 5–15 cm. high; fls. VII–IX. China; locally in An., Che., Ki. Damp shaded banks.
2. **Pilea hamaoi** Mak. (Mak. F. 644). Herb, to 5 dm.; fr. X. Japan, China; locally in Ku. Moist shaded places.
3. **Pilea notata** C.H. Wright (F.H.E. 3:476). Suffruticose, to 5 dm.; fls. white, VII. Central China; locally in An., Che., Ki. Shaded streamsides.

45. **SANTALACEAE** Sandalwood Family 檀香科 (T'an Hsiang K'o; Fragrant Wood Family)

Herbs (ours), shrubs or trees: *lvs. alternate, entire*: calyx tube joined to the ovary: fr. 1-seeded. 25 genera with 250 species, in temperate and tropical regions; 4 genera and 6 species in China. Included here is the sandalwood of commerce.

1. **Thesium** Linn. 百蕊草属 (Pai Jui Ts'ao Shu)

Mostly herbaceous root parasites: lvs. narrow, 1–3-nerved: *fls. bisexual, solitary and axillary*; calyx tube joined to the ovary, the lobes extending above it. About 100 species, mostly in the Old World tropics; 2 in China.

1. **Thesium chinense** Turcz. 百蕊草 (Pai Jui Ts'ao; Hundred-bud Herb) (Mak. F. 638). Herb, 1–3 dm. high; fls. greenish white, V; fr. VI–VIII; semi-parasitic on roots. China, Japan; locally in Ku., Che. Grassland. Fig. 71.

46. **OLACACEAE** Olax Family 青皮木科 (Ch'ing P'i Mu K'o)

Trees or shrubs with *alternate* simple *entire lvs.*: *fls. bisexual*; petals present, sometimes cleft; stamens 3–12: fr. a drupe, surrounded by the enlarged calyx. 26 genera with 130 species, mostly in tropical regions; 3 genera and 6 species in China.

1. **Schoepfia** Schreb. 青皮木属 (Ch'ing P'i Mu Shu)

Shrubs: *lvs. rounded at the base*: racemes axillary, many-fld.: fls. fragrant, yellow; stamens 4–5, epipetalous; stigma 3-lobed; ovary half-superior: fr. a drupe. 5 species, in Asia and South America; 3 in China. (Named for Giovanni Schoepf, a German who travelled and collected plants in the vicinity of Ulm.)

1. **Schoepfia jasminodora** Sieb. & Zucc. 青皮木 (Ch'ing P'i Mu; Green Bark Tree) (Fa. B. 1:13). Shrub, to 10 m.; fl. IV fragrant; fr. VI–VIII. Japan, China; locally in An., Ku., Che. Open woodland. Fig. 72.

47. **LORANTHACEAE** Mistletoe Family 桑寄生科 (Sang Chi Sêng K'o)

Shrubs, parasitic on trees: *lvs. opposite*, entire and coriaceous, without stipules, or wanting: fls. unisexual, usually axillary; petals 4–8; stamens opposite the petals; ovary inferior: fr, a 1-seeded berry or drupe. 21 genera with about 600 species, in tropical and temperate regions; 5 genera and about 30 species in China.

Key to the Genera

Lvs. pinnately veined: brs. brown ..... 1. *Loranthus*
Lvs. wanting or 3-nerved: brs. green ..... 2. *Viscum*

1. **Loranthus** Linn. 桑寄生属 (Sang Chi Sêng Shu)

Brts. brown: *lvs. pinnately veined*: fls. perfect or unisexual; perianth 4–6-parted: fr. a berry. About 500 species, mostly in the Old World tropics; 18 in China. (Greek: *loros*, strap; and *anthos*, flower; referring to the shape of the sepals.)

1. **Loranthus yadoriki** Sieb. & Zucc. 桑寄生 (Sang Chi Sêng; Mulberry Parasite) (Chen 252). Shrub; fls. reddish brown, VII–X; brts. brown. Japan, China; locally in Ki., Che. Parasitic on brs. of trees. Fig. 73.

B. H. Danser has proposed a new system of classification for the *Loranthinae* which includes the Linnaean genus *Loranthus* (Bul. Jard. Bot. Buit. ser. III. 10 (3): 291-373). In his revision entitled "The Loranthaceae of French Indo-China and Siam" (l.c. 16 (1): 1-63. 3 figs. Bibliog.. 6 of the 12 genera given are for species treated by Engler and Krause (Pflanzenfam. Ed. 2. II. 16b: 144-168) as belonging to the genus *Loranthus*. Our species (*L. yadoriki*) belongs to section *Cichlanthus*, according to Diels (Di. F. 305). This section has been separated by Danser (l.c) 16: 34) under the Linnaean genus *Scurrula* which was placed as a synonym of *Cichlanthus* by Engler and Krause (l.c. 152).

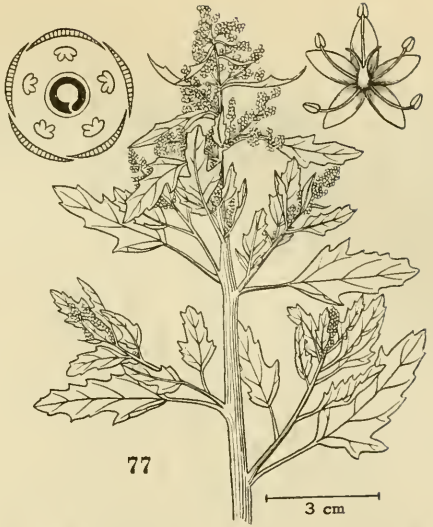
2. **Viscum** Linn. 槲寄生属 (Hu Chi Sêng Shu; Oak Parasite Genus)

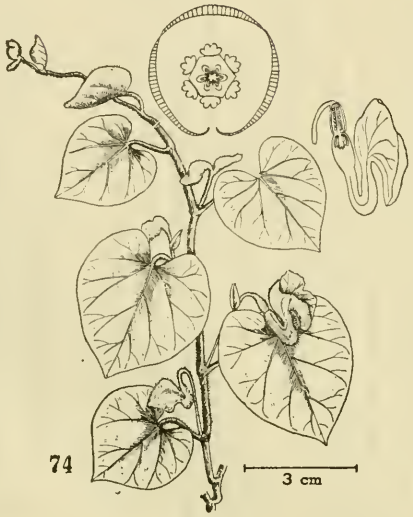
Brts. green: *lvs. 3-nerved or wanting*: dioecious: perianth 3–4-parted; anthers opening by many pores: fr. succulent. About 30 species, in temperate and tropical regions; 6 in China. (The Latin name for mistletoe.)

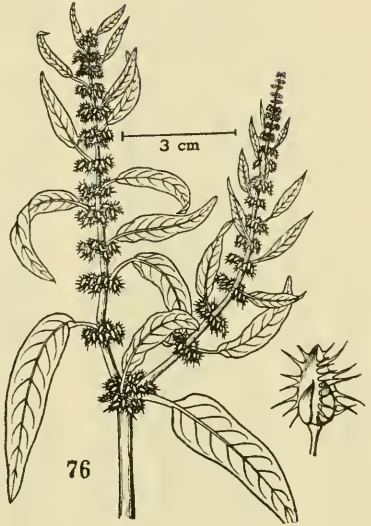
1. **Viscum angulatum** Heyne ex DC. (H.F. 5:225). Shrub, to 1 m.; fls. yellowish, III–IV; fr. X–III; brs. green. China; locally in Ku., Che. Parasitic on brs. of trees.

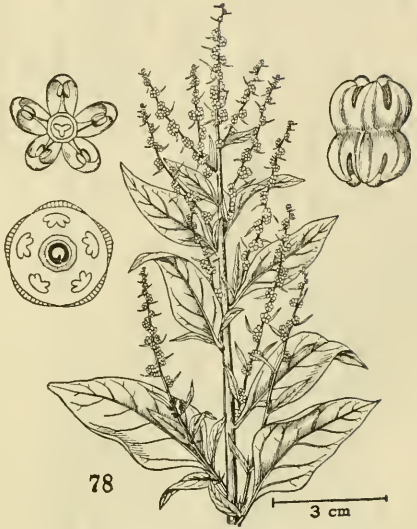
48. **ARISTOLOCHIACEAE** Birthwort Family 馬兜鈴科 (Ma Tou Ling K'o)

Perennial herbs (ours), sometimes shrubby: *lvs. alternate or basal*, cordate, entire: *perianth* 3-lobed, *irregular, corolline*; ovary inferior, 4–6 celled: *fr. a capsule*. 5 genera with over 200 species, in tropical and temperate regions; 3 genera and about 20 species in China.









73. Loranthus yadoriki
74. Aristolochia mollissima

75. Tovara virginiana var.
76. Rumex maritimus

77. Chenopodium album
78. Betavulgaris

Key to the Genera

Caulescent herbs or vines: fls. irregular; stamens 6; anthers versatile.... 1. *Aristolochia*
Stemless herbs: fls. regular; stamens 12, with filaments..... 2. *Asarum*

1. **Aristolochia** Linn. Birthwort 馬兜鈴屬 (Ma Tou Ling Shu)

Plants with *lfy.* usually *twining stems*: *perianth* colored, the tube *inflated above the ovary*, the chamber opening by a narrow hairy passage to the outer part of the flower: capsule septicidally 6-valved. About 180 species, mostly tropical; 10 in China. (From the Greek terms meaning "best" and "Child-birth," on account of its supposed medicinal qualities.)

Key to the Species

Plant glabrous: lvs. deltoid-oblong, about twice as long as broad ..... 1. *A. debilis*
Plant densely woolly-hairy: lvs. cordate, about as broad as long..... 2. *A. mollissima*

1. **Aristolochia debilis** Sieb. & Zucc. 馬兜鈴 (Ma Tou Ling; Horse-bridle Bell) (Mak. F. 634). Climbing herb; fls. purple, VII–IX; fr. IX–X. Japan, China; locally in Ki., Che. Woodland.
2. **Aristolochia mollissima** Hance 淮通藤 (Huai T'ung T'êng) (J.B. 1879, 300). Herbaceous vine; fls. reddish purple, V–VI. China; locally in Ku. Brushland. Fig. 74.

2. **Asarum** Linn. Wild Ginger 杜衡屬 (Tu Hêng Shu)

Stemless, with aromatic creeping rootstocks: *lvs. 1 or 2*, long-petiolate: *fls. solitary*, regular, dark purple, close to the ground; perianth 3-cleft: capsule somewhat fleshy. 13 species, in north temperate regions; 8 in China. (Ancient Latin name.)

1. **Asarum sieboldii** Miq. 細辛 (Hsi Hsin; Delicate Acrid Flavor) (Mak. F. 636). Perennial herb; fls. IV–VI; medicinal rhizome. China and Korea; locally in An., Ku. Shady places.

49. **POLYGONACEAE** Buckwheat Family 蓼科 (Liao K'o)

Herbs or shrubs with *simple alternate lvs.* and *sheathing stipules* called ocreae: fls. usually perfect; ovary superior: *fr. an achene*, sometimes enclosed in an enlarged and rarely fleshy perianth. About 35 genera with 800 species; 7 genera and 85 species in China.

Key to the Genera

A. Herbs (rarely shrubs): brs. not conspicuously flattened: fr. dry (exceptions in *Polygonum*).
  B. Perianth 5- or 4-parted, not much enlarged in fr.
    Style persistent, 2-parted to the base, with recurved hooked tips..... 1. *Tovara*
    Style neither persistent nor hooked at the tip ..... 2. *Polygonum*
  BB. Perianth 6-parted, the inner segments often much enlarged in fr.
    Ocreae large and conspicuous: stamens usually 8-10: stout herbs with broad basal lvs ..... 3. *Rheum*
    Ocreae not conspicuous: stamens 6: common weeds..... 4. *Rumex*
AA. Shrubs with flat ribbon-like brs.: fr. fleshy, an achene surrounded by the fleshy perianth..... 5. *Muehlenbeckia*

1. **Tovara** Adans. Jumpseed 金線草屬 (Chin Hsien Ts'ao Shu)

Erect perennial herbs from knotted rhizomes: *perianth 4-parted*, not much

enlarged in fr.; *styles persistent, 2-parted* to the base, *with recurved hooked tips*: achene lenticular, light brown, included in the perianth at maturity. One species, in North America and eastern Asia. (Named for Simon a Tovar, Spanish physician of the 16th century.)

1. **Tovara virginiana** (L.) Raf. var. **filiformis** (Thunb.) Steward 金線草 (Chin Hsien Ts'ao; Golden Thread Herb) (Ste. Po. 14). Erect herb, to 1 m.; fr. red, VIII–IX. Eastern North America and eastern Asia; locally in An., Che., Hup., Ki., Ku. Forest shade. Fig. 75.

2. **Polygonum** Linn. Knotweed 蓼屬 (Liao Shu)

Herbs and shrubs with *jointed stems*: *fls. in fascicles*, from small sheaths called ocreolae, on jointed pedicels; perianth 4–5- or rarely 6-parted, often petal-like, and frequently persistent in fr.: achenes triangular or lenticular. About 200 species, widely distributed; 100 in China. (Greek: *polus*, many; and *gonu*, knee; referring to the nodes of the stem.)

Key to the Species

a. Fls. in axillary fascicles (Sect. Avicularia).
  Plants slender, glaucous, prostrate or ascending; lvs. linear to lanceolate, sessile or nearly so, mostly not over 5 mm. broad. 1. *P. aviculare*
  Plants robust, erect, generally without glaucous bloom; lvs. oblong to lanceolate, petiolate, margins often crisped, 5–15 mm. broad ..... 1a. *P. aviculare* var. *vegetum*

aa. Flg. fascicles not axillary.
  b. Infl. spiciform.
    c. Spikes cylindric to subfiliform, not capitate: ocreae not tubular (Sect. Persicaria).
      d. Ocreae with an herbaceous limb at the top, at least when young ..... 2. *P. orientale*
      dd. Ocreae membranous.
        e. Ocreae eciliate, or sometimes very finely ciliate . 3. *P. lapathifolium*
        ee. Ocreae ciliate.
          f. Plant (except the fls.) scabrous with long spreading hairs; stems and peduncles viscous, glandular-hairy..... 4. *P. viscosum*
          ff. Plants glabrous or pubescent, sometimes scabrid with short appressed hairs, or the peduncles glandular-hairy.
            g. Infl. rather dense and continuously cylindric.
              Ocreae bearing coarse bristles 2/3 as long as the tube or longer; lf. blades coriaceous.
                Spikes of the infl. rather densely fld.; perianth about 2 mm. long: achenes triangular: bristles mostly longer than the tube of the ocrea ..... 5. *P. barbatum*
                Spikes of the infl. rather laxly fld.: perianth 2.5–6 mm. long: achenes triangular or biconvex; bristles usually shorter than the tube of

the ocrea ..... 6. *P. japonicum*
Ocreae without very coarse long bristles; lf. blades membranous ..... 7. *P. jucundum*
gg. Infl. laxly fld. and often elongated.
Perianth conspicuously glandular-punctate: achenes finely reticulate or striate ..... 8. *P. hydropiper*
Perianth eglandular: achenes smooth and shining ..... 9. *P. caespitosum*
cc. Spikes ovoid or subglobose, capitate: ocreae not tubular (Sect. Cephalophilon).
Lf. blades narrowly lanceolate: fls. conspicuously exserted ..... 10. *P. criopolitanum*
Lf. blades ovate to deltoid, usually punctate: fls. not conspicuously exserted ..... 11. *P. nepalense*
bb. Infl. more or less openly paniculate.
h. Stems and petioles armed with recurved prickles (Sect. Echinocaulon).
i. Ocreae (or some of them) expanded into herbaceous wings at the top.
Plant glabrous; lvs. peltate: perianth becoming fleshy and berry-like in fr. ..... 12. *P. perfoliatum*
Plants more or less pubescent; lvs. not peltate: perianth not becoming fleshy in fr.
Ocreolae densely puberulent: achenes dull black: fls. not exserted beyond the ocreolae ..... 13. *P. senticosum*
Ocreolae fringed with conspicuous cilia: achenes lemon-yellow or brown, roughened: some of the fls. exserted ..... 14. *P. thunbergii*
ii. Ocreae membranous, not foliaceous or wing-tipped.
Lf. blades oblong-cordate, often slightly sagittate, 4–15 cm. long and 2–8 cm. broad: fls.: few and scattered in open panicles ..... 15. *P. dissitiflorum*
Lf. blades linear to oblong or ovate, up to 10 cm. long and 2 cm. broad: fls. generally more densely arranged ..... 16. *P. strigosum*
hh. Plants not armed.
Three of the perianth segments enlarged and bearing wing-like expansions in fr.: faces of the achenes black, more or less roughened (Sect. Tiniaria).
Plants with twining stems; lf. blades ovate-cordate.. 17. *P. multiflorum*
Plants with erect stems; lf. blades ovate to orbicular. 18. *P. cuspidatum*
Perianth segments not enlarged in fr.: faces of the achene brown: lf. blades triangular (Sect. Fagopyrum) ..... 19. *P. fagopyrum*

1. **Polygonum aviculare** Linn. Knotgrass 萹蓄 (Pien Hsü) (G.M. 580). Prostrate or ascending herb; fls. pink, V–VII, in axillary fascicles. Eurasia; locally in An., Che., Hon., Hup., Ki., Ku. Roadside weed.

1a. **Polygonum aviculare** Linn. var. **vegetum** Ledeb. (G.M. 580). Erect, robust herb. An., Che., Hon., Hup., Ku.

2. **Polygonum orientale** Linn. Prince's Feather 紅草 (Hung Ts'ao; Red Herb) (B. M. 348). Erect herb, to 2 m.; fls. pink, VII–IX; fr. black, VIII–IX. Southern

and eastern Asia, Philippines, East Indies; locally in An., Che., Hup., Ki., Ku. Waste places, sometimes cultivated, ornamental.

3. **Polygonum lapathifolium** Linn. 早苗蓼 (Tsao Miao Liao; Early-sprouting Polygonum) (G.M. 603). Erect herb, 5–25 dm. high; fls. greenish white or pink, VI–VIII. Eurasia; locally in An., Che., Hup., Ki., Ku. Moist fields and ditchbanks.
4. **Polygonum viscosum** Hamilt. ex D. Don 香蓼 (Hsiang Liao; Fragrant Polygonum) (Mak. F. 623). Ascending herb, 4–8 dm. high; fls. deep pink, IX–X. Southeastern Asia; locally in Che., Hup., Ku. Roadside weed.
5. **Polygonum barbatum** Linn. var. **gracile** (Danser) Steward 毛蓼 (Mao Liao; Hairy Polygonum) (Ste. Po. 55). Weak-stemmed herb; fls. V–VI. Southeastern Asia; locally in An., Ku. Roadside weed.
6. **Polygonum japonicum** Meisn. 蠶繭草 (Ts'an Chien Ts'ao; Silkworm-cocoon Herb) (Mak. F. 618). Erect herb, 5–10 dm. high; fls. white or pink, VII–IX. Eastern Asia; locally in An., Che., Hup., Ku. Moist places.
7. **Polygonum jucundum** Meisn. (DC. P. 14:103). Slender herb, 3–6 dm. high; fls. white or pinkish, IX–X; fr. black; fls. conspicuously exserted. Eastern and central China; locally in Che., Hup., Ku. Moist places.
8. **Polygonum hydropiper** Linn. Water Pepper 水蓼 (Shui Liao; Water Polygonum) (G.M. 584). Erect or ascending herb, 2–6 dm. high; fls. greenish, IX–X, Eurasia; locally in An., Che., Hup., Ki., Ku. Wet places.
9. **Polygonum caespitosum** Blume (*P. blumei* Meisn.) 馬蓼 (Ma Liao; Horse Polygonum) (Mak. F. 616; Ste. Po. 67). Creeping herb; fls. white or rose, VII–IX; achenes smooth. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Roadside weed.
10. **Polygonum criopolitanum** Hance (Ste. Po. 70). Creeping herb; fls. VIII. Southern and central China; locally in Che., Hup., Ki., Ku. Field weed.
11. **Polygonum nepalense** Meisn. (*P. alatum* Hamilt.) 野蕎麥草 (Yeh Ch'iao Mai; Wild Buckwheat) (Mak. F. 623). Annual, 1–5 dm. high; fls. pinkish, VII–VIII. Eastern Asia, Africa; locally in An., Che., Hup., Ki. Field weed.
12. **Polygonum perfoliatum** Linn. 扛板归 (Kang Pan Kuei) (Mak. F. 621). Climbing herb; fls. white or pink; fr. blue, baccate, VIII–IX. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Moist thickets.
13. **Polygonum senticosum** (Meisn.) Franch. & Savat. 廊茜 (Lang Yin; Verandah Cushion) (Mak. F. 621). Climbing herb; fls. white or pink, VIII–IX; fr. brown, IX–X. China and Japan; locally in Che., Ki., Ku. Roadside weed.
14. **Polygonum thunbergii** Sieb. & Zucc. var. **maackianum** (Regel) Maxim. 鹿蹄草 (Lu T'i Ts'ao; Deer-hoof Herb) (Mak. F. 620). Decumbent herb; fls. white or pink, VIII–IX. Eastern Asia; locally in An., Che., Hup., Ku. Moist shaded places.
15. **Polygonum dissitiflorum** Hemsl. (F.H.E. 2:338). Brg. herb, to 1 m.; fls. pink or white, VII–VIII, few and scattered. Eastern China, Korea; locally in An., Che., Ki. Forest shade.
16. **Polygonum strigosum** R. Br. var. **pedunculare** (Wall.) Steward (Ste. Po. 91). Ascending herb; fls. pink, VII–IX, in short spikes. Eastern Asia to Australia; locally in An., Ku. Moist places.
17. **Polygonum multiflorum** Thunb. 何首烏 (Ho Shou Wu; The Black-haired Ho) (Mak. F. 625). Woody vine; fls. greenish white, IX–X; fr. X–XI; root medicinal, for turning white hair black. Eastern Asia; locally in An., Ku. Roadside thickets.

18. **Polygonum cuspidatum** Sieb. & Zucc. 虎杖 (Hu Chang; Tiger Stick) (G.M. 589). Bushy herb, to 2 m., fls. white, VI–IX; fr. IX–X. Japan, China; locally in An., Ki., Ku. Pond margins and ditch banks.
19. **Polygonum fagopyrum** Linn. (*Fagopyrum esculentum* Moench) Buckwheat 蕎麥 (Ch'iao Mai) (B.M. 349; G.M. 589). Erect annual, to 1 m.; fls. pink or white, V–IX; fr. brown, VIII–IX. Eurasia; locally in An., Ki., Ku. Cultivated for its "grain".

3. **Rheum** Linn. 大黃屬 (Tai Huan Shu; Great-yellow Genus)

Stout erect perennial *herbs* with *large basal lvs.* and conspicuous ocreae: fls. perfect; *stamens mostly 9*; styles 3: achenes strongly winged. About 25 species, in Asia; 6 or more in China. (The Greek name.)

1. **Rheum rhaponticum** Linn. Garden Rhubarb (B.M. 349). Stout herb, 1–2 m. high. Siberia; locally in Ki., Ku. Cultivated for its fleshy lf. stalks which are used for food.

4. **Rumex** Linn. Dock 酸模屬 (Suan Mo Shu)

Herbs: *ocreae not conspicuous*: fls. mostly greenish; *perianth of 6 segments*, the outer 3 herbaceous, and *the inner enlarged in fr.*, often bearing a grain-like tubercle; *stamens 6*; styles 3. 125 species, widely distributed in temperate regions; about 12 in China. (The Latin name.)

Key to the Species

a. Fls. perfect or polygamous: none of the lvs. hastate.
  b. Valves entire or nearly so, granular ..... 1. *R. patientia*
  bb. Valves spiny, fimbriate, or dentate.
    c. Valves spiny, narrowly winged, granular.
      Valves conspicuously reticulate, with a few stout spines; granules broadly oblong ..... 2. *R. dentatus*
      Valves not reticulate, with many slender spines; granules narrowly oblong ..... 3. *R. maritimus*
    cc. Valves fimbriate, dentate, or toothed, broadly winged.
      Valves fimbriate or sharply dentate, granular ..... 4. *R. japonicus*
      Valves pectinately toothed, not granular; teeth often hooked. 5. *R. nepalensis*
aa. Fls. dioecious: at least some of the lvs. hastate.
  Calyx much enlarged in fr., not granular ..... 6. *R. acetosa*
  Calyx scarcely at all enlarged in fr..... 7. *R. acetosella*

1. **Rumex patientia** Linn. Patience Dock (G.M. 569). Erect herb, to 1 m.; fls. V–VI; fr. VI–VIII. Eurasia; locally in An. Roadside weed.
2. **Rumex dentatus** Linn. (H.F. 5:59). Erect herb, to 1 m.; fls. V; fr. VI. Southern and eastern Asia; locally in Ku. Pond margins and ditch banks.
3. **Rumex maritimus** Linn. 連明子 (Lien Ming Tzŭ) (H.F. 5:59). Erect herb, to 1 m.; fls. VI–VII; fr. V–VII. Eurasia, Africa and the Americas; locally in Ku. Roadside weed. Fig. 76.
4. **Rumex japonicus** Meisn. 羊蹄 (Yang T'i; Goat-hoof) (Mak. F. 630). Coarse herb. to 1 m; fls. V–VI; fr. VI–VII. Japan, China; locally in Ku. Roadside weed.
5. **Rumex nepalensis** Spreng. 牛兒黃草 (Niu Êrh Huang Ts'ao; Yellow-cow-colored Herb, (H.F. 5:60) Coarse herb, to 1 m.; fls. VII. Asia, south Africa; locally in Ki. Roadside weed.
6. **Rumex acetosa** Linn. Garden Sorrel 酸模 (Suan Mu; Sour Sorrel) (G.M. 571). Erect herb, 4–8 dm. high; fls. pink, III–V; fr. IV–VI. Eurasia, North America;

locally in An., Ki., Ku. Roadside and field weed.

7. **Rumex acetosella** Linn. Sheep Sorrel 小酸模 (Hsiao Suan Mu; Small Sorrel) (G.M. 571). Herb, to 3 dm.; fls. VII. Eurasia, North Africa; locally in Ku. Moist ground.

5. **Muehlenbeckia** Meisn. 竹節蓼屬 (Chu Chieh Liao Shu)

Shrubs, sometimes with *flattened brs.*: *lvs.* alternate, sometimes *wanting*: fls. unisexual; *perianth* 5-parted, the outer segments *becoming fleshy* and surrounding the triangular achene *in fr.*; *stamens usually 8*. About 15 species, in the south temperate zone; one cultivated in China. (After H. G. Muehlenbeck, a German physician, 1798–1845.)

1. **Muehlenbeckia platyclados** (Muell.) Meisn. Centipede Plant 竹節蓼 (Chu Chieh Liao; Bamboo-joint Polygonum) (*Homalocladium platycladum* (Muell.) Bailey) (B.M. 351). Shrub, to 0.5 m.; fls. pinkish, III; fr. purplish, III. Introduced from Solomon Islands; locally in Ku. Cultivated, ornamental.

50. **CHENOPODIACEAE** Goosefoot Family 藜科 (Li K'o)

Herbs, often *succulent*: *lvs. alternate*: fls. small, the *perianth herbaceous* or fleshy: *fr.* a *1-seeded* utricle or achene. 75 genera with 600 species; 13 genera and 35 species in China.

Key to the Genera

A. Fls. bisexual.
  B. Lvs. with broad blades, usually angled, toothed or lobed.
    Fls. Without bracts; calyx not becoming hardened or woody in fr. ..... 1. *Chenopodium*
    Fls. with bracts; calyx becoming hardened and woody in fr. 2. *Beta*
  BB. Lvs. linear or awl-shaped.
    Lvs. not fleshy: fls. in small clusters ..... 3. *Kochia*
    Lvs. fleshy: fls. sessile ..... 4. *Suaeda*
AA. Fls. unisexual; bracts enclosing the fr. ..... 5. *Spinacia*

1. **Chenopodium** Linn. Goosefoot 藜屬 (Li Shu)

Mealy or glandular *weeds*: *lvs. flat*: *fls. bisexual*, in small sessile clusters, *without bracts*; perianth usually 5-parted, enclosing the fr.; *stamens 5*: seeds lenticular. About 60 species, in temperate regions; 10 in China. (Greek: *chen*, a goose; and *podos*, foot.)

1. **Chenopodium album** Linn. Lamb's Quarters 灰灰菜 (Huei Huei Ts'ai) (G.M. 594). Brg. herb, to 1 m.; fls. gray-green, IV–IX; sepals keeled in fr. Eurasia; locally in An., Hon., Ki., Ku. Garden weed. Fig. 77.

2. **Beta** Linn. Beet 菾菜屬 (T'ien Ts'ai Shu)

Glabrous herbs with *flat* entire or sinuate *lvs.*: *fls. bisexual, with bracts*; *perianth* 5-parted, *hardened* and woody *in fr.*: fr. usually an aggregate, from 2 or more fls., the "seeds" of commerce. About 6 species, in Eurasia and North Africa; one cultivated in China. (The Latin name.)

1. **Beta vulgaris** Linn. Beet 菾菜 (T'ien Ts'ai) (B.M. 353). Erect herb, 1–1.5 m. tall; fls. greenish; fr. brown; roots edible. Europe, a cultigen; locally in An., Ki., Ku. Garden root vegetable. Fig. 78.

3. **Kochia** Roth 地膚屬 (Ti Fu Shu)

Herbs or shrubs with *narrow* or terete *lvs.*: *fls.* sessile, *in small clusters* or

solitary; perianth 5-lobed, expanding to wings in fr.; stamens 5: fr. a utricle. About 40 species, mostly of the Old World; one in China. (After W.D.J. Koch, a German botanist, 1771–1849.)

1. **Kochia scoparia** Schrad. Summer Cypress 地肤 (Ti Fu; Earth Skin) (B.M. 353). Bushy herb, to 1 m.; fls. VIII–X; herbage purple-red in the autumn. Eurasia; locally in An., Ku. Weed, sometimes grown as ornament. Fig. 79.

4. **Suaeda** Forsk. Sea Blite 鹽蓬屬 (Hsien P'êng Shu)

Fleshy plants of saline situations: *lvs.* terete and *fleshy*, *linear*: *fls. sessile* in the axils of lfy. bracts; perianth 5-parted, enclosing the utricle, often crested; stamens 5. About 40 species, in salt marshes and alkali steppes throughout the world; 7 in China. (An Arabic name.)

1. **Suaeda maritima** (L.) Dumort. 鹽蓬 (Hsien P'êng) (G.M. 600). Diffuse herb, to 6 dm. Eurasia, North Africa, North America; locally in Ku. Salt flats.

5. **Spinacia** Linn. Spinach 菠菱屬 (Po Ling Shu)

Erect herbs with triangular or hastate lvs.: *dioecious*: pistillate *fls. and frs. enclosed by* a pair of perianth-like *bracts*; stigmas 4 or 5. 3 or 4 species, in southwestern Asia; one cultivated in China. (Latin: *spina*, on account of the spiny fr.)

1. **Spinacia oleracea** Linn. Prickly-seeded Spinach 菠菜 (Po Ts'ai) (B.M. 354). Erect herb, to 1 m.; fls. greenish; used as a potherb. Southwestern Asia; locally in An., Ki., Ku. Grown for the leaves. Fig. 80.

51. AMARANTHACEAE Amaranth Family 莧科 (Hsien K'o)

Mostly *herbs* (ours), with simple lvs.: fls. small, but infls. sometimes showy; *fl. bracts and perianth scarious*, sometimes colored; perianth segments in 1 series; stamens 1–5: fr. commonly a circumscissile utricle. About 40 genera with 500 species, widely distributed, especially in the warmer regions of the world; about 10 genera and over 20 species in China.

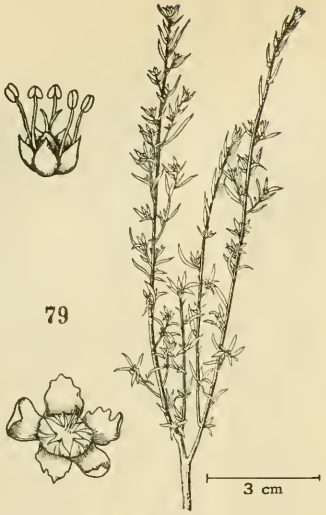
Key to the Genera

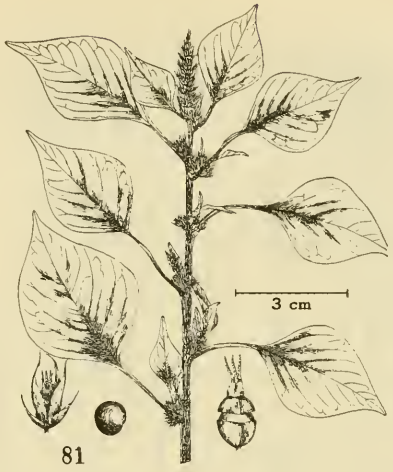
A. Lvs. alternate: anthers 2-celled.
  Fr. 1-seeded: filaments distinct; fls. monoecious or polygamous.. 1. *Amaranthus*
  Fr. 2- or more-seeded: filaments united at the base; fls. perfect... 2. *Celosia*

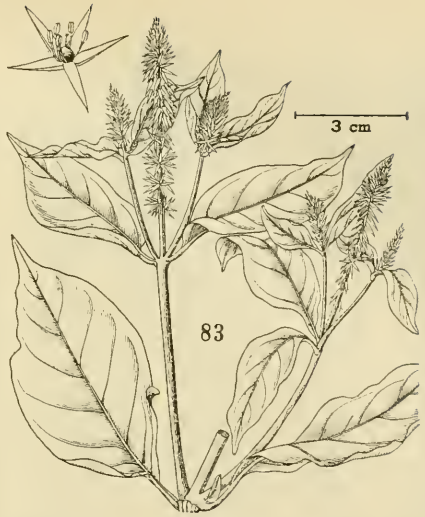
AA. Lvs. opposite.
  Fls. deflexed at maturity, in elongated spikes; bracts and perianth segments spiny; anthers 2-celled..... 3. *Achyranthes*
  Fls. not deflexed, in head-like clusters; bracts and perianth segments not spiny; anthers 1-celled.
    Prostrate wild or roadside plants: fls. in sessile clusters up to 1 cm. across; bracts white; stigma capitate ..... 4. *Alternanthera*
    Erect garden plant: fls. in peduncled heads 1.5–2 cm. in diam.; bracts often tinged pink; stigma bifid..... 5. *Gomphrena*

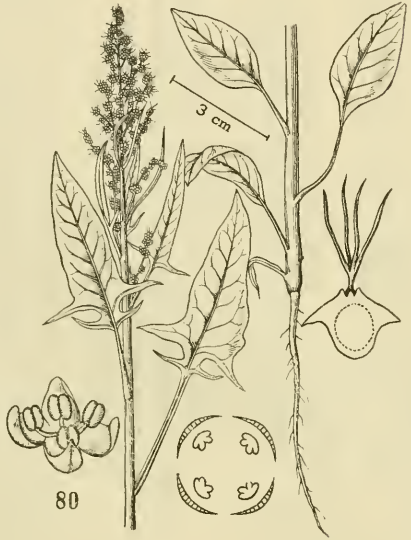
1. **Amaranthus** Linn. Amaranth 莧屬 (Hsien Shu)

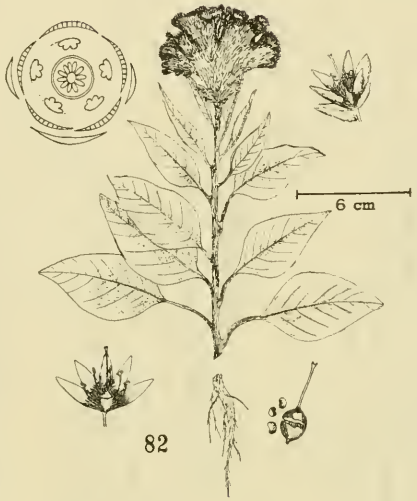
Coarse annuals with alternate entire lvs.: fls. monoecious or polygamous, in dense green or reddish spikes or panicles, 3-bracteate: perianth glabrous: *filaments distinct*: *fr. a 1-seeded* utricle. About 50 species, widely distributed; 10 in China, including field weeds and some cultivated for greens. (Greek: *amarantos*, unfading, because the perianth and fl. bracts do not wither or fade.)

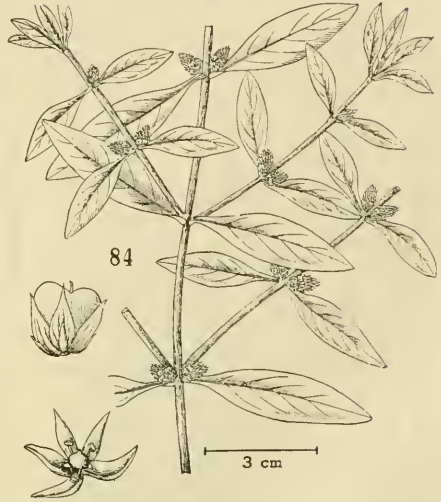












79. Kochia scoparia
80. Spinacia oleracea

81. Amaranthus tricolor
82. Celosia argentea var.

83. Achyranthes bidentata
84. Alternanthera sessilis

Key to the Species

a. Plants not spiny.
  b. Bracts and sepals setaceous.
    Spikes of the infl. slender and well developed, especially at the tips of the brs.: lvs. larger below; the blades usually with acute or acuminate tips ..... 1. *A. cruentus*
    Spikes of the infl. mostly in axillary clusters, occurring down to the base of the plant, not strongly developed at the tips of the brs.: lvs. larger above; the blades usually obtuse or notched at the tips.
      Plant diffusely brg. and procumbent, grown as a lf. vegetable ..... 2. *A. mangostanus*
      Plant stout and erect: lvs. often colored brownish purple or red: grown as an ornamental ..... 3. *A. tricolor*
  bb. Bracts and sepals not setaceous: lf. blades ovate, obtuse, or notched at the tips ..... 4. *A. viridis*
aa. Plant spiny ..... 5. *A. spinosus*

1. **Amaranthus cruentus** Linn. Purple Amaranth 鴉穀莧 (Ya Ku Hsien; Crow-grain Amaranth) (G.M.602). Coarse herb; fls. tinged reddish, VII–IX. Tropical countries; locally in An., Che., Ku. Roadside weed.
2. **Amaranthus mangostanus** Linn. 莧菜 (Hsien Ts'ai) (H.F.4:720). Erect herb; fls. VIII. Eastern Asia; locally in Ku. Grown for its leaves. Regarded by Dr. Jonathan Sauer as probably not specifically distinct from *A. tricolor*.
3. **Amaranthus tricolor** Linn. 雁来紅 (Yen Lai Hung; Red-when-the-wild-geese-come) (B.M.355). Stout herb, to 1.5 m.; fls. reddish, VIII. Tropical Asia; locally in Ku. Cultivated, ornamental. Fig. 81.
4. **Amaranthus viridis** Linn. 野莧 (Yeh Hsien: Wild Amaranth) (M.F.193). Slender herb; fls. green, VI–IX. Tropical countries; locally in Che., Ku. Common weed.
5. **Amaranthus spinosus** Linn. Thorny Amaranth 刺莧 (Tz'ŭ Hsien) (G.M.603). Erect herb, to 1 m.; fls. green, VI–IX. Tropical countries; locally in Ku. Common weed.

2. **Celosia** Linn. 鷄冠屬 (Chi Kuan Shu)

Coarse annuals: stems terminated by dense chaffy spikes: spikes sometimes enlarged and highly colored; the stem often fasciated to form a "cockscomb": *filaments united* at the base: *fr. 2- or more-seeded.* About 40 species, in the warm countries of the world; 2 or 3 species in China. (Greek: *kelos*, burned, because of the appearance of the infl.)

Key to the Species

Spikes of the infl. conical to oblong, white or pink ..... 1. *C. argentea*
Spikes of the infl. fasciate, convolute, cristate or feathered; in color ranging from white and yellow to purple and red ..... 1. a. *C. argentea* var. *cristata*

1. **Celosia argentea** Linn. 青箱 (Ch'ing Hsiang) (G.M.601) Erect herb, 1–1.5 m. tall; fls. white or pink, VII–IX. Tropical Asia; locally in An., Ki., Ku. Field weed.

1.a. **Celosia argentea** Linn. var. **cristata** (L.) Ktze. Cockscomb 鷄冠 (Chi Kuan) (G.M.601). Erect herb, 1–1.5 m. high; fls. white or red. Tropical Asia; locally in An., Ki., Ku. Grown for ornament. Fig. 82.

3. **Achyranthes** Linn. 牛膝屬 (Niu Hsi Shu)

Coarse herbs with *opposite lvs.*: *fls. in elongated spikes, deflexed* at maturity; bracts and perianth segments spiny; stamens 4–5, the filaments united at the base: fr. an indehiscent 1-seeded utricle. 12 species, tropical and subtropical; 2 in China. (Greek: *achuron,* chaff; and *anthos* a flower.)

KEY TO THE SPECIES

Staminodes fimbriate: bracteoles ovate, half as long as their spine or longer ..... 1. *A. aspera*
Staminodes toothed: bracteoles usually reduced to a spine, minutely 2-auricled at the base ..... 2. *A. bidentata*

1. **Achyranthes aspera** Linn. (M.F.195). Erect herb, 3–10 dm. high; medicinal. Tropical countries; locally in Ku., An. Dry places.
2. **Achyranthes bidentata** Blume 土牛膝 (T'u Niu Hsi; Wild-cow Knee) (H.F.4:730). Erect herb, to 1 m.; fls. greenish, VII–XI. Southern and eastern Asia; locally in An., Che., Hup., Ki., Ku. Roadside thickets. Fig. 83.

4. **Alternanthera** Forsk. 蓮子草屬 (Lien Tzŭ Ts'ao Shu)

Prostrate or spreading *herbs* with *opposite lvs.*: fls. in small white axillary heads, with *white bracts*; *stigmas capitate*; *anthers 1-celled*: fr. 1-seeded. About 16 species, tropical and subtropical; 2 in China. (From the Latin terms meaning "alternate" and "anther".)

1. **Alternanthera sessilis** R. Br. 蓮子草 (Lien Tzŭ Ts'ao; Lotus-seed Herb) (Mak. F.606). Creeping herb; fls. white, IX. Tropical and subtropical countries; locally in Che., Ku. Moist roadsides and ditchbanks. Fig. 84.

5. **Gomphrena** Linn. 千日紅屬 (Ch'ien Jih Hung Shu)

Erect herbs with thickened nodes and *opposite lvs.*: *fls. in peduncled heads,* often with pink or purple bracts; *stigmas bifid*; *anthers 1-celled*: fr. 1-seeded. About 70 species, in South America and Australia; one cultivated as an ornamental in China. (The Greek name of a related plant.)

1. **Gomphrena globosa** Linn. GLOBE AMARANTH 千日紅 (Ch'ien Jih Hung; Red-for-a-thousand-days) (B.M.356). Bushy herb; fls. white or pink. All warm countries; locally in Ku. Grown for ornament. Fig. 85.

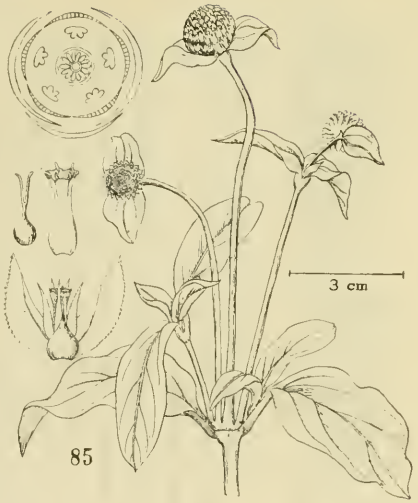
52. **PHYTOLACCACEAE** POKEWEED FAMILY 商陸科 (Shang Lu K'o)

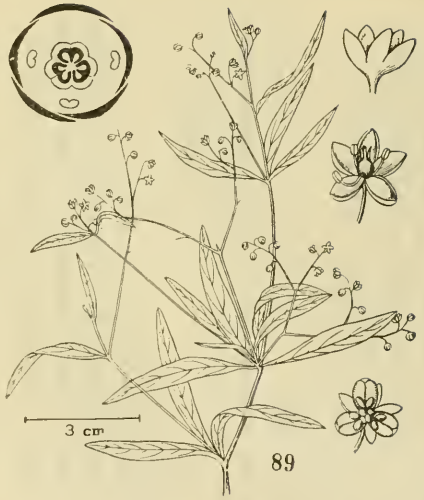
Herbs (ours), shrubs or trees, with *alternate* entire *lvs.*: *perianth petaloid*: *fr. a berry.* 22 genera with 100 species, in tropical and subtropical America and South Africa; one species cultivated in China.

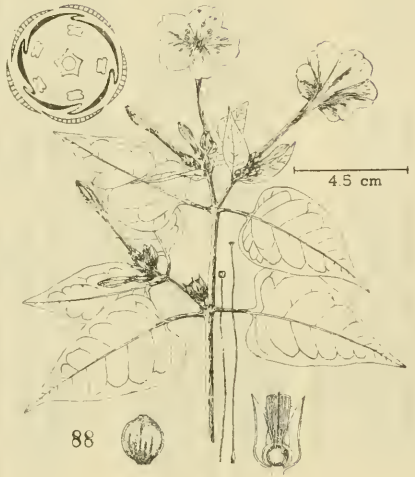
1. **Phytolacca** Linn. POKEWEED 商陸屬 (Shang Lu Shu)

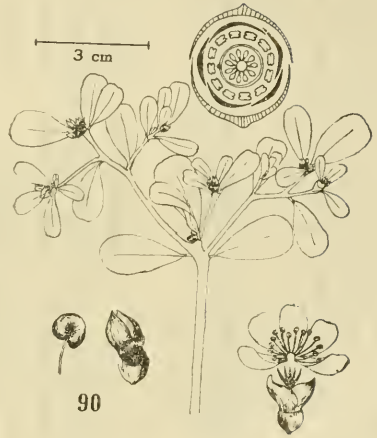
Stout erect perennial herbs (ours), shrubs or trees with *large lvs.*: *fls.* small, *in terminal racemes*; perianth of 5 petaloid sepals; stamens 5–30: *fr. a* 5–12-celled *berry.* 26 species, mostly American; one cultivated in China. (Greek: *phyto,* plant; and French: *lac,* lake (a color) referring to the crimson juice of the berries.

1. **Phytolacca acinosa** Roxb. 商陸 (Shang Lu) (Mak.F.604). Stout herb, 1–1.5 m. high; fls. white or pink, V–VII; fr. black, VII–IX; medicinal. Himalayas, eastern Asia; locally in An., Che., Hon., Ki., Ku. Cultivated. Fig. 86.









85. Gomphrena globosa
86. Phytolacca acinosa

87. Bougainvillea spectabilis
88. Mirabilis jalapa

89. Mollugo pentaphylla
90. Portulaca oleracea

53. **NYCTAGINACEAE** Four-O'Clock Family 紫茉莉科 (Tzŭ Mo Li K'o)

Herbs, shrubs, trees or woody vines with simple entire lvs.: fls. often with involucre; *perianth* often *petaloid*: *fr.* an achene, *enclosed in the hardened base of the perianth.* 19 genera with 175 species, most abundant in tropical America; 4 genera and 5 or more species, some of them cultivated for ornament, in China.

Key to the Genera

Climbing vines: fls. enclosed by colored bracts: lvs. alternate ..... 1. *Bougainvillea*
Perennial herbs: fls. not enclosed by colored bracts: lvs. opposite: plant dries black ..... 2. *Mirabilis*

1. **Bougainvillea** Comm. 九重葛屬 (Chiu Ch'ung Ko Shu)

Climbing spiny *vines* with *alternate lvs.*: infl. showy: *fls.* borne in 3's, inserted *on large red or purple bracts*; perianth tubular: ovary stipitate. 7 species, from South America; one grown for ornament in China. (In honor of A. de Bougainville, French navigator, 1729–1811.)

1. **Bougainvillea glabra** Choisy 九重葛 (Chiu Ch'ung Ko; Nine-layered Pueraria) (B.M.358). Woody vine; fls. VII; bracts conspicuous, magenta, purple, pink, orange or white. Introduced from Brazil; locally in Ku. Occasionally grown for ornament.

Bougainvillea spectabilis Willd. is a closely related species distinguished by having copious pubescence on almost all parts of the plant. Fig. 87. A number of horticultural varieties have been described from these species in cultivation on the basis of variations in color and form of bracts and leaves. The robust crimson-fld. *B. buttiana* (also known as Crimson Lake) is believed to be of garden origin and is closely related to *B. glabra*.

2. **Mirabilis** Linn. 紫茉莉屬 (Tzŭ Mo Li Shu)

Perennial herbs with opposite lvs.: involucres sometimes 1-fld.; bracts often herbaceous, resembling a calyx: perianth tubular, corolline, variously colored: fr. an ovoid coriaceous utricle. About 25 species, from tropical America; one grown as an ornament in China. (Latin for "wonderful".)

1. **Mirabilis jalapa** Linn. Four-O'Clock 紫茉莉 (Tzŭ Mo Li; Purple Jasmine) (G.M.606). Spreading herb, to 1 m.; fls. red, pink or white, VIII–IX; involucre calyx-like. Introduced from tropical America; locally in An., Ki., Ku. Cultivated, ornamental. Fig. 88.

54. **AIZOACEAE** Carpetweed Family 番杏科 (Fan Hsing K'o; Foreign Apricot Family)

Herbs with *entire opposite* (ours) *lvs.*: fls. small, regular and perfect; *calyx persistent*; *petals none*; ovary of 2–5 united carpels; styles as many as the carpels: *fr. a capsule.* 7 genera with over 50 species, mostly in Africa; 2 genera and 3 or 4 species in China.

1. **Mollugo** Linn. Indian Chickweed 粟米草屬 (Su Mi Ts'ao Shu)

Spreading herbs with small *axillary fls.*; stamens and styles 3–5: *capsule enclosed by the sepals,* membranous. About 12 species, mostly in the Old World tropics; 2 or 3 in China. (The Latin name of a soft plant.)

1. **Mollugo pentaphylla** Linn. 粟米草 (Su Mi Ts'ao; Millet Herb) (Mak.F.604). Low spreading herb; fls. white, VII–VIII. Eastern and southeastern Asia; locally in An., Che., Ku. Field weed. Fig. 89.

55. PORTULACACEAE Purslane Family 馬齒莧科 (Ma Ch'ih Hsien K'o)

Succulent herbs (ours) or shrubs with watery sap: lvs. entire: fls. terminal, often surrounded by a whorl of lvs.; *sepals 2*: *petals 5*; ovary 1-celled: *fr. a circumscissile capsule* with *numerous seeds*. 18 genera with 200 species, widely distributed; 2 genera and 4 species in China.

Key to the Genera

Calyx 2-cleft; stamens inserted on the calyx: fleshy annuals ..... 1. *Portulaca*
Calyx of 2 distinct sepals; stamens inserted on the receptacle; plants perennial ..... 2. *Talinum*

1. Portulaca Linn. Purslane 馬齒莧屬 (Ma Ch'ih Hsien Shu)

Fleshy *annual* herbs: lvs. with scaly or hairy appendages at the nodes: *calyx 2-cleft*; stamens inserted on the calyx. About 20 species, mostly American; 2 in China, one grown as an ornamental, the other a field and garden weed. (An old Latin name.)

Key to the Species

Lvs. terete: plant hairy: fls. of various bright colors, over 2 cm. across 1. *P. grandiflora*
Lvs. flat: plant glabrous: fls. yellow, about 1 cm. across ..... 2. *P. oleracea*

1. **Portulaca grandiflora** Hook. Rose-Moss 半支蓮 (Pan Chih Lien; Half-branch Lotus) (B.M.365). Fleshy annual; fls. of bright colors, VII–VIII. Brazil and southward; locally in Ku. Grown for ornament.
2. **Portulaca oleracea** Linn. Common Purslane 馬齒莧 (Ma Ch'ih Hsien; Horse-tooth Amaranth) (G.M.608). Fleshy annual; fls. yellow, VII–VIII. All warm countries; locally in An., Ki., Ku. Field weed; widely used as a pot-herb and also eaten raw. Fig. 90.

2. Talinum Adans. 櫨蘭屬 (Lu Lan Shu)

Succulent herbs or shrubs with alternate estipulate lvs.: calyx of *2 distinct sepals*; stamens inserted on the receptacle. About 15 species, mostly tropical; one cultivated in China. (Greek: *thalia*, a green branch.)

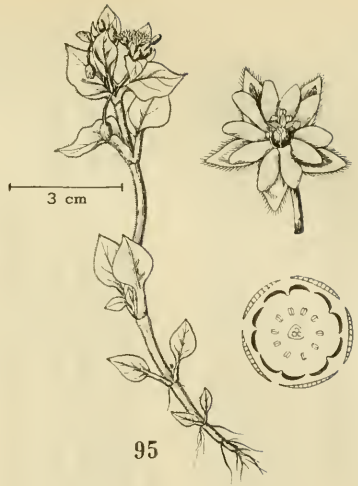
1. **Talinum triangulare** (Jacq.) Willd. (*T. crassifolium* (Jacq.) Willd.) 櫨蘭 (Lu Lan; Sumach Orchid) (Mak.F.602; I.K.2:1032). Erect perennial, to 1 m.; fls. pink, IX–X. Introduced from West Indies; locally in An., Che., Ku. Cultivated as a pot-herb and salad vegetable, also medicinal and ornamental. Fig. 91.

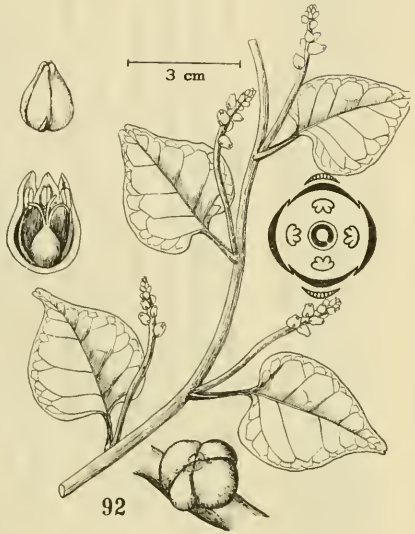
56. BASELLACEAE Basella Family 落葵科 (Lo K'uei K'o)

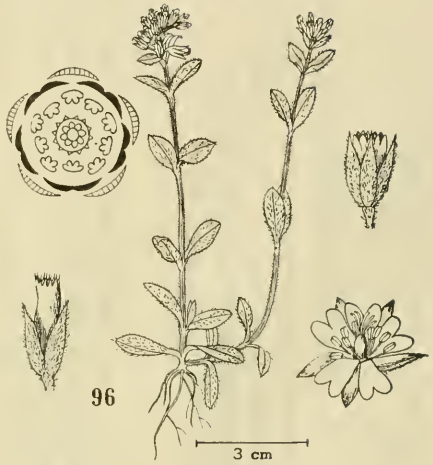
Twining fleshy herbaceous *vines* with *alternate* entire *lvs.*: fls. bisexual, small, with 2 bracts and *2 sepals*; petals and stamens 5: *fr. indehiscent, 1-seeded*. 5 genera with 15 species, in tropical America and Asia; one species often cultivated in China.

1. Basella Linn. Malabar Nightshade 落葵屬 (Lo K'uei Shu)

Fls. in axillary spikes, white or red; *sepals not winged*; *filaments* erect in the bud.







91. Talinum triangulare
92. Basella rubra

93. Sagina saginoides
94. Arenaria serpyllifolia

95. Stellaria media
96. Cerastium viscosum

One wide-ranging tropical species, cultivated in China. (The native Malabar name.)

1. **Basella rubra** Linn. 落葵 (Lo K'uei; Falling Malva) (B.M.367). Herbaceous vine; fls. red, X; 2 sepals. Introduced from tropical Asia; locally in Ki., Ku. Cultivated for ornament; leaves and shoots used for food. Fig. 92.

57. CARYOPHYLLACEAE Pink Family 石竹科 (Shih Chu K'o)

Herbs with *opposite entire lvs.* and regular fls.: *sepals* or calyx lobes *5*; stamens distinct, not more than 10; ovary usually 1-celled, with free central or basal placenta: fr. a capsule (rarely a berry); styles 2–5. 70 genera with over 1200 species, abundant in temperate and cold regions; 13 genera and about 50 species in China.

Key to the Genera

A. Sepals distinct; petals without claws.
  B. Lvs. awl-shaped ..... 1. *Sagina*
  BB. Lvs. flat.
    Pod short, ovoid, opening by valves.
      Petals entire ..... 2. *Arenaria*
      Petals deeply 2-cleft ..... 3. *Stellaria*
    Pod cylindrical, opening by teeth at the top ..... 4. *Cerastium*
AA. Sepals united into a tube; petals clawed.
  C. Calyx without bracts at the base.
    D. Calyx 5-nerved; styles 2.
      Calyx scarious between the green nerves ..... 5. *Gypsophilla*
      Calyx green and 5-angled, not scarious ..... 6. *Saponaria*
    DD. Calyx 10- or more-nerved.
      Styles 3 ..... 7. *Silene*
      Styles 5 ..... 8. *Lychnis*
  CC. Calyx with bracts at the base ..... 9. *Dianthus*

1. **Sagina** Linn. Pearlwort 漆姑草屬 (Ch'i Ku Ts'ao Shu)

Prostrate matted herbs with thread-like or *awl-shaped lvs.*: fls. small, at the ends of the brs.; *sepals distinct*; *petals*, when present, *undivided*. About 10 species, in the northern hemisphere; one in China. (Latin: *sagina*, fattening, from its supposed food value; an old name of the spurry.)

1. **Sagina saginoides** (L.) Karst. (*S. linnaei* Presl) 漆姑草 (Ch'i Ku Ts'ao; Close-relatives Herb) (G.M.616). Prostrate herb; fls. white, V–VI. North temperate regions; locally in Ku. Moist places. Fig. 93.

2. **Arenaria** Linn. Sandwort 蚤綴屬 (Tsao Chui Shu)

Low tufted herbs with *flat* sessile *lvs.* and small white fls.: *petals*, when present, *entire*, or barely notched; stamens 10: *pod short*, ovoid, *opening by valves*. About 150 species, widely distributed; 6 in China. (Latin: *arena*, sand, referring to the habitat of the species.)

1. **Arenaria serpyllifolia** Linn. Thyme-leaved Sandwort 蚤綴 (Tsao Chui; A. string-of-fleas) (G.M.618). Low herb; fls. white, IV–V. Eurasia; locally in An., Che., Ku. Roadside weed. Fig. 94.

3. **Stellaria** Linn. Chickweed 繁縷属 (Fan Lü Shu)

Brg. herbs with flat lvs.: *petals*, when present, white and *deeply 2-cleft*; *pod short, opening by valves*. About 75 species, abundant in temperate and cold climates; 16 in China. (The Latin term for "star", referring to the star-shaped fls.)

Key to the Species

a. Rhizomes without tubers: lvs. many.
  Stems and pedicels glabrous: lvs. lanceolate or oblong ..... 1. *S. alsine*
  Stems and pedicels pubescent: lvs. ovate, often cordate at the base.
    Styles 3-4; petals shorter than the sepals..... 2. *S. media*
    Styles 5; petals longer than the sepals ..... 3. *S. aquatica*
aa. Rhizomes tuber-bearing: lvs. few, obovate, acute ..... 4. *S. rupestris*

1. **Stellaria alsine** Grimm (*S. uliginosa* Murr.) (G.M.623). Herb; fls. white, VI. North temperate regions; locally in An., Ku. Roadside weed.
2. **Stellaria media** (L.) Cyr. Common Chickweed 繁縷 (Fan Lü; A-tangle-of-thread) (G.M.622). Brg. herb, 15–30 cm.; fls. white, II–III. Eurasia; locally in An., Che., Hon., Ku. Roadside weed. Fig. 95.
3. **Stellaria aquatica** (L.) Scop. Water Chickweed 牛繁縷 (Niu Fan Lü; Cow Stellaria) (G.M.7th 383). Herb, 1–2 dm. high; fls. white, I–IX; fr. green. Eurasia; locally in An., Ku. Moist ground.
4. **Stellaria rupestris** (Turcz.) Hemsl. (*Krascheinnikowia rupestris* Turcz.) 和田草 (Ho T'ien Ts'ao; Rice-field Herb) (Le.F.1:373). Herb; fls. white, IV. Northeastern Asia; locally in An. Moist roadsides.

4. **Cerastium** Linn. Mouse-ear Chickweed 寄奴花属 (Chi Nu Hua Shu)

Generally *hairy herbs*: fls. white, in terminal dichotomous cymes; petals, when present, emarginate or bifid: *capsule cylindric, opening by teeth* at the top. About 50 species, abundant in temperate regions; 6 in China. (Greek: *keras*, a horn, referring to the shape of the pod.)

1. **Cerastium viscosum** Linn. 婆婆指甲菜 (P'o P'o Chih Chia Ts'ai; Grandmother's-finger-nails Herb) (G.M.628). Brg. herb; fls. white, III–IV; glandular-hairy. Introduced from Europe; locally in An., Ki., Ku. Field weed. Fig. 96.

5. **Gypsophila** Linn. 香菜花属 (Hsiang Ts'ai Hua Shu; Fragrant-plant Flower Genus)

Diffusely brg. glaucous herbs with few lvs. and small numerous white or pink fls. in panicles or axillary clusters: *calyx 5-toothed, scarious between the* 5 *green nerves*; petals 5, with narrow claws; stamens 10; *styles* 2: capsule globose or ovoid, many-seeded. 60 species, in Eurasia and North Africa; 5 or more in China. (Greek: term for "gypsum-loving", referring to their preference for calcareous soils.)

1. **Gypsophila paniculata** Linn. Baby's Breath 線形瞿麥 (Hsien Hsing Ch'ü Mai; Thread-like *Dianthus superbus*) (G.M.635). Erect diffuse herb, to 1 m.; fls. white V; pedicels longer than the calyx. Eurasia; locally in Hon., Ku. Cultivated, ornamental.

6. **Saponaria** Linn. 王不留行属 (Wang Pu Liu Hsing Shu)

Coarse herbs with *large fls.*: *calyx 5-angled* and 5-nerved; stamens 10; *styles 2*:

pod 4-toothed at the apex. About 3 species, natives of Eurasia; one occurring as a weed in China. (Latin: *sapo*, soap, because the mucilaginous juice of some species forms a lather in water.)

1. **Saponaria vaccaria** Linn. Cow Herb 王不留行 (Wang Pu Liu Hsing: The-Emperor-cannot-detain-it-on-the-way)* (G.M.635). Erect herb, to 5 dm.; fls. pink, IV–V; calyx wing-angled in fr. Introduced from Europe; locally in An., Ku. Field weed. *A powerful laxative. Fig. 97.

7. **Silene** Linn. Catchfly 女蔓菜属 (Nü Lü Ts'ai Shu)

Herbs with pink, red, or white fls.: *calyx 10- or more-nerved*, more or less *inflated*, without bracts at the base; stamens 10; *styles* generally *3*: pod dehiscent by apical teeth. About 250 species, widely distributed; 5 or more in China. (Greek: *sailon*, saliva; or *Silenus*, the slavering drunken demigod, referring to the viscid secretions of many species; note the English name, "Catchfly".)

Key to the Species

a. Calyx many-ribbed, conical, glandular-hairy; petals pink ..... 1. *S. conoidea*
aa. Calyx ribs about 10.
  b. Calyx club-shaped, 1.5–3 cm. long.
    Calyx about 1.5 cm. long; petals pink, emarginate ..... 2. *S. armeria*
    Calyx about 3 cm. long; petals white, fimbriate ..... 3. *S. fortunei*
  bb. Calyx cylindric, 1–1.5 cm. long.
    Calyx not over 1 cm. long; petals white ..... 4. *S. aprica*
    Calyx about 1.5 cm. long; petals pink ..... 5. *S. pendula*

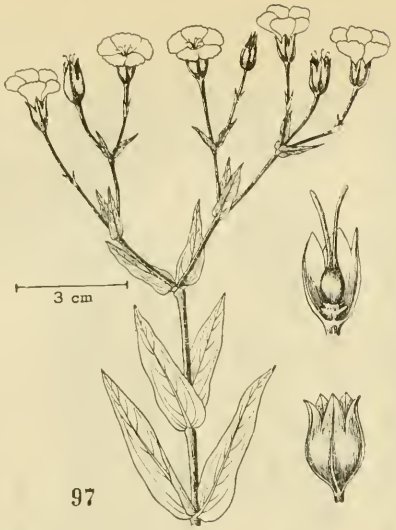
1. **Silene conoidea** Linn. (H.F.1:218). Erect herb, 6–8 dm. high; fls. pink, V. Eurasia, North Africa; locally in Ku. Grassland. Fig. 98.
2. **Silene armeria** Linn. Sweet William Catchfly 捕蟲瞿麥 (Pu Ch'ung Ch'ü Mai) (G.M.633). Herb; fls. pink, V–VI. Introduced from southern Europe; locally in An., Ku. Cultivated, ornamental.
3. **Silene fortunei** Vis. 野蚊子草 (Yeh Wên Tz'ŭ Ts'ao; Wild Mosquito Herb) (B.H.684). Erect herb, 8–10 dm. high; fls. white, VII–VIII. China; locally in An., Che., Hup., Ki., Ku. Grassland.
4. **Silene aprica** Turcz. 女蔓菜 (Nü Lü Ts'ai; Female Artemisia) (Ko. & Kl. 497). Erect herb, to 5 dm.; fls. white, V–VII. Northeastern Asia; locally in An., Ku. Grassland.
5. **Silene pendula** Linn. Nodding Catchfly 大蔓樱草 (Ta Man Ying Ts'ao; Great Spreading Primrose) (G.M.634). Brg. herb, to 3 dm.; fls. pink, IV–V; petals 2-parted, crowned. Mediterranean region; locally in Ku. Cultivated, ornamental.

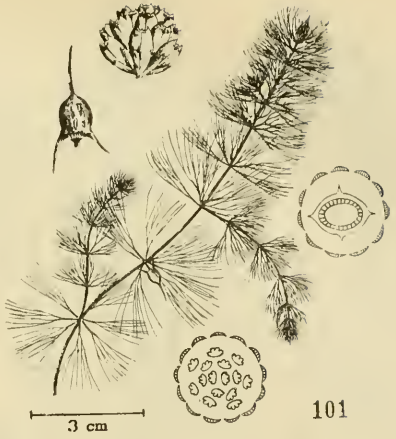
8. **Lychnis** Linn. Campion 剪夏羅属 (Chien Hsia Lo Shu)

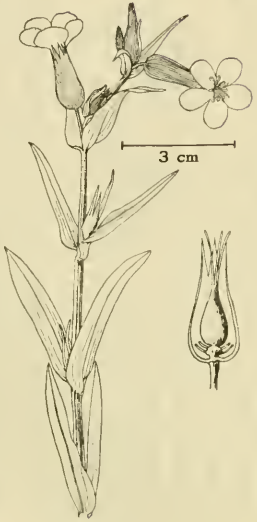
Erect slender herbs, similar to *Silene*, but with *5* (rarely 4) *styles*. About 40 species, native to north temperate and arctic regions, some grown for their fls.; 5 in China. (Greek: *luchnos*, a light or lamp, referring to the flame-colored fls. of some species.)

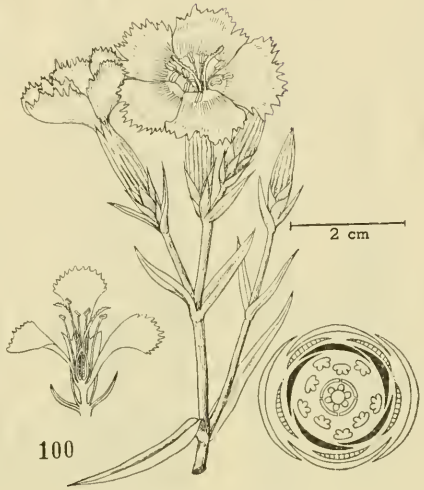
Key to the Species

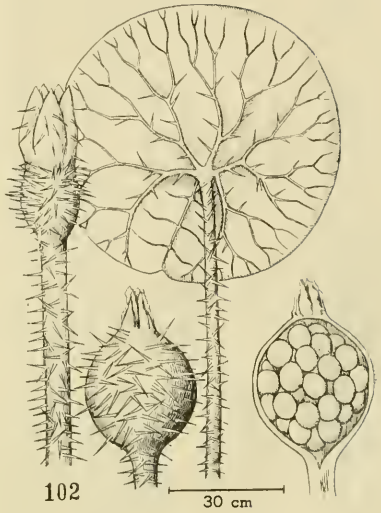
Plant glabrous, or nearly so: lvs. ovate: fls. sessile ..... 1. *L. coronata*
Plant hairy: lvs. lanceolate, much reduced above or on the fl.-bearing brs.: fls. pedicelled ..... 2. *L. senno*











97, Saponaria vaccaria
98. Silene conoidea

99. Lychnis coronata
100. Dianthus chinensis

101. Ceratophyllum demersum
102. Euryale ferox

1. **Lychnis coronata** Thunb. 剪夏羅 (Chien Hsia Lo; Cut-summer-gauze) (B.M.378). Erect herb, to 1 m.; fls. red, VII–IX. China, Japan; locally in An., Che., Ki., Ku. Grassland. Fig. 99.
2. **Lychnis senno** Sieb. & Zucc. 剪秋羅 (Chien Ts'iu Lo; Cut-autumn-gauze) (Mak. F. 586). Perennial herb; fls. IX. Japan, China; locally in An., Ki., Ku. Grassland.

9. **Dianthus** Linn. Pink 石竹属 (Shih Chu Shu)

Stiff erect mostly perennial *herbs with narrow lvs.*: fls. terminal, solitary or in clusters; *calyx with bracts* at the base; stamens 10; styles 2: capsule cylindric or oblong. About 200 species, in the eastern hemisphere, especially the Mediterranean region, several grown for their fls.; 6 in China. (Greek: *Dios,* of Jupiter; and *anthos,* a flower.)

Key to the Species

a. Petals dentate or toothed, not fimbriate.
  Fls. in dense head-like clusters ..... 1. *D. barbatus*
  Fls. loosely clustered, few, or solitary.
    Calyx bracts abruptly pointed; petals not bearded ..... 2. *D. caryophyllus*
    Calyx bracts with slender green tips; petals barbed or hairy near the base..... 3. *D. chinensis*
aa. Petals fimbriate; fls. loosely clustered or solitary ..... 4. *D. superbus*

1. **Dianthus barbatus** Linn. Sweet William 十様錦 (Shih Yang Chin; Complete Ornament) (G.M.636). Erect herb, to 5 dm.; fls. VI. Eurasia; locally in Ku. Cultivated, ornamental.
2. **Dianthus caryophyllus** Linn. Carnation 荷蘭瞿麥 (Ho Lan Ch'ü Mai; Holland *Dianthus superbus*) (B.M.375). Erect herb, to 5 dm.; fls. pink or white, fragrant, VII. Eurasia; locally in Ku. Cultivated, ornamental.
3. **Dianthus chinensis** Linn. 石竹 (Shih Chu; Rock Bamboo) (Mak.F.583). Erect herb, 3–5 dm. high; fls. pink or red, VI–VIII. Eurasia; locally in An., Che. Hon., Ki., Ku. Grassland. Fig. 100.
4. **Dianthus superbus** Linn. 瞿麥 (Ch'ü Mai; Timid Wheat) (Mak.F.581). Erect herb, to 1 m.; fls. pink, VII–IX. Eurasia; locally in An., Che., Hon., Ku. Grassland.

##. **DIALYPETALAE** 雙被花煩 (Shuan Pei Hua Lei; Double Perianth Flower Group)

Perianth differentiated into calyx and corolla.

58. **CERATOPHYLLACEAE** Hornwort Family 金魚藻科 (Chin Yü Tsao K'o)

Submersed aquatic herbs with *whorled finely dissected lvs.*: fls. unisexual, very small, sessile and axillary, without true perianth, but with a many-parted involucre: *stamens numerous*; anthers sessile or nearly so; ovary superior: *fr. an achene.* One species, in tropical and temperate regions, but not in Australia.

1. **Ceratophyllum** Linn. Hornwort 金魚藻属 (Chin Yü Tsao Shu)

Characters of the family. One species. (Greek: *ceras,* a horn; and *phyllon,* a leaf.)

1. **Ceratophyllum demersum** Linn. Hornwort 金魚藻 (Chin Yü Tsao; Goldfish Water Plant) (G.M.636). Submersed herb; fr. VII–VIII; lf. segments serrate. Warm and temperate regions; locally in Ku. Ponds and slow streams. Fig. 101.

59. NYMPHAEACEAE Water Lily Family 睡蓮科 (Shui Lien K'o)

Aquatic herbs with cordate or peltate *floating* (except in *Nelumbo*) *lvs.*: fls. large, solitary; perianth showing a *transition from sepals to petals*: lvs. and fls. long-stalked: stamens numerous; ovary and fr. compound, from the union of several carpels. 8 genera with about 50 species, in all temperate and tropical regions; 3 genera and 6 species in China.

Key to the Genera

A. Plants densely prickly: carpels buried in the receptacle; fls. reddish purple ..... 1. *Euryale*

AA. Plants not prickly.

Fr. a leathery berry.

Petals very small and stamen-like; stamens inserted under the ovary; fls. yellow ..... 2. *Nuphar*

Petals large, numerous; stamens inserted on top of the ovary; fls. white or pink ..... 3. *Nymphaea*

Fr. flat-topped, the 1-seeded carpels embedded separately in the receptacle.: fls. rose-colored or white ..... 4. *Nelumbo*

1. Euryale Salisb. 芡實屬 (Ch'ien Shih Shu)

A coarse *prickly* aquatic herb: *lvs.* floating, the largest in our flora, sometimes *1 m. in diam., heavily corrugated with spiny ribs* and purplish beneath: *fls.* violet *purple*, mostly enclosed by 4 persistent sepals; carpels buried in the receptacle: seeds 8–20, edible. One species, in Eastern Asia, closely allied to the famous *Victoria regia* of tropical America which has lvs. 2 m. in diam. (From a Greek word.)

1. **Euryale ferox** Salisb. 芡實鷄頭 (Ch'ien Shih, Chi T'ou; Chicken Head) (Mak. F. 578). Coarse aquatic herb; fls. purplish red, VII–IX; fr. X–XI. Eastern Asia; locally in An., Ku. Ponds and shallow lakes. Fig. 102.

2. Nuphar Sm. 萍蓬草屬 (P'ing P'êng Ts'ao Shu; Floating Mat Genus)

Aquatic herbs with thick cylindric horizontal rootstocks and large floating lvs.; blades with a deep sinus: *fls.* showy, *yellow* or purplish; sepals 5–6, concave, petaloid; *petals* many, *small, stamen-like,* hypogynous; stamens many, inserted under the superior ovary; carpels several, united into a compound ovary: fr. ovoid, many-seeded. About 8 species, in north temperate regions; 2 in China. (From *naufar*, or *nyloufar*, the Arabic name of *Nymphaea*.)

1. **Nuphar pumilum** (Timm) DC. (*N. minimum* Sm.) 萍蓬草 (P'ing P'êng Ts'ao; Floating-mat Herb) (Mak.F.579). Aquatic herb; fls. yellow, IX. Japan, China; locally in An., Che. Ponds and slow streams.

3. Nymphaea Linn. Water Lily 睡蓮屬 (Shui Lien Shu)

Aquatic herbs with floating lvs. from creeping rhizomes: fls. showy, white, yellow, pink, red or blue, floating; petals large and numerous: fr. a spongy berry ripening under water. 20 species, in most temperate and tropical countries; 2 in China. (Latin: *Nymphae,* the water nymphs.)

1. **Nymphaea tetragona** Georgi 睡蓮 (Shui Lien; Sleeping Lotus). (G.M.641). Aquatic herb; fls. VIII–IX. Eastern Asia and North America; locally in Che., Ku. Ponds and lakes. Fig. 103.

4. **Nelumbo** Adans. 蓮属 (Lien Shu)

Large aquatic herb with *milky juice*: *lvs. peltate,* raised high above the water: fls. usually pink or white, sometimes yellow; petals and stamens many; *carpels* many, *sunk in the flat top of an obconic fleshy receptacle,* with smooth bony pericarp: seeds edible. 2 species, one in Asia and Australia, the other in tropical America. (*Nelumbo,* the name in Ceylon.)

1. **Nelumbo nucifera** Gaertn. East Indian Lotus 蓮 (Lien) (B.M.385). Coarse aquatic herb; fls. pink or white, VI–VIII; fr. IX–X. Southern Asia to Australia; locally in An., Che., Ki., Ku. Ponds and lakes. Fig. 104.

60. **RANUNCULACEAE** Crowfoot Family 毛茛科 (Mao Kên K'o)

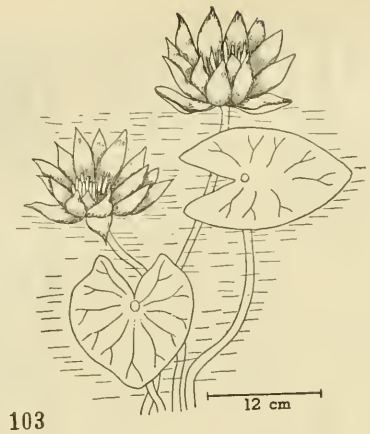
Mostly *terrestrial plants* with colorless *acrid juice* and *alternate lvs.* (except *Clematis*): base of the petioles often clasping or sheathing the stem: sepals often petaloid; petals sometimes wanting; stamens numerous: frs. achenes, follicles or berries. About 35 genera with 1,000 species, throughout the world, but less abundant in the tropics; 18 genera and over 170 species in China.

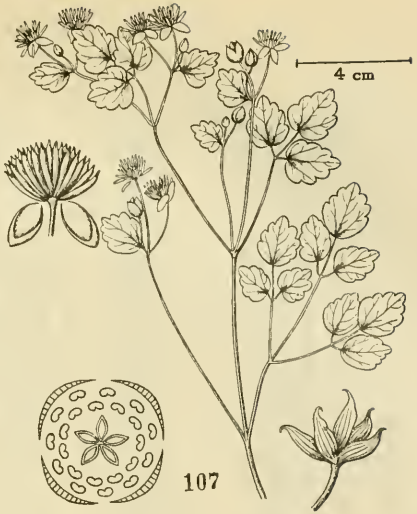
Key to the Genera

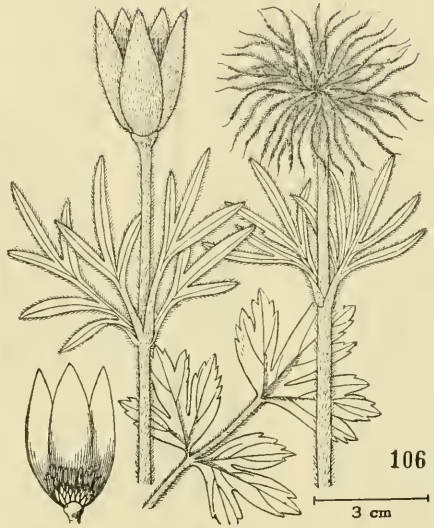
A. Vines, often woody, climbing by lf. stalks ..... 1. *Clematis*
AA. Erect herbs and shrubs.
B. Tall herbs or shrubs with large fls. (8 cm. or more in diam.).. 2. *Paeonia*
BB. Herbs with small or medium-sized fls.
C. Fr. an achene.
Fls. subtended by an involucre of bracts which may resemble a calyx ..... 3. *Anemone*
Fls. without an involucre.
Petals present; fls. showy ..... 4. *Ranunculus*
Petals lacking; fls. small and numerous ..... 5. *Thalictrum*
CC. Fr. a follicle.
D. Flowers regular.
Petals saccate at base, but not spurred ..... 6. *Semiaquilegia*
Petals forming long spurs ..... 7. *Aquilegia*
DD. Flowers irregular.
Upper sepals spurred, enclosing the 2 upper spurred petals ..... 8. *Delphinium*
Upper sepals hooded, enclosing the 2 upper petals, which are not spurred ..... 9. *Aconitum*

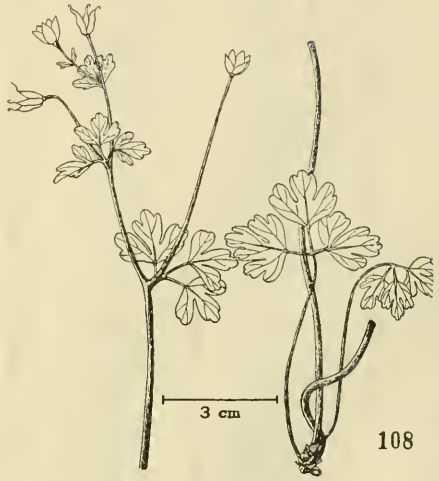
1. **Clematis** Linn. Virgin's Bower 鉄線蓮属 (T'ieh Hsien Lien Shu)

Perennials, mostly woody *vines,* with *opposite* usually compound *lvs.*, climbing by *twining lf. stalks*: fls. apetalous, usually perfect; sepals petaloid; carpels many, developing into *achenes* with long persistent plumed styles. About 230 species, mostly of north temperate regions; over 90 in China. (The Greek name of a slender vine.)









103. Nymphaea tetragona
104. Nelumbo nucifera

105. Paeonia suffruticosa
106. Anemone chinensis

107. Thalictrum fortunei
108. Semiaquilegia adoxoides

Key to the Species

a. Peduncles axillary, 1-fld.
  Lvs. simple ..... 1. *C. henryi*
  Lvs. compound.
    Lvs. ternate; lfts. sharply toothed ..... 2. *C. montana*
    Lvs. biternate; lfts. entire or with a few lobes or teeth ..... 3. *C. florida*
aa. Infl. in axillary or terminal panicles.
  b. Panicles mostly 3-5-fld. ..... 4. *C. finetiana*
  bb. Panicles several-fld.
    c. Lvs. trifoliolate, incised or cleft, pubescent ..... 5. *C. apiifolia*
    cc. Lvs. mostly 5-foliolate.
      d. Margins of the lfts. entire.
        Plants darkened conspicuously in drying: pedicels glabrous ..... 6. *C. chinensis*
        Plants not darkened conspicuously in drying.
          Pedicels pubescent: achenes ovate, pubescent .... 7. *C. paniculata*
          Pedicels glabrous: achenes oblanceolate, glabrous. 8. *C. uncinata*
      dd. Margins of the lfts. variously incised.
        Sepals nearly glabrous outside ..... 9. *C. brevicaudata* var. *lissocarpa*
        Sepals densely pubescent outside ..... 10. *C. grata*

1. **Clematis henryi** Oliv. (H.I.19:1819). Woody vine; fls. white. China; locally in An., Che. Forest undergrowth.
2. **Clematis montana** Buch.-Ham. acc. to DC. (R.M.214). Woody climber to 8 m.; fls. V; fr. VI; achenes glabrous, styles plumose. Himalayas, central and western China; locally in An., Ki. Woodland.
3. **Clematis florida** Thunb. 鉄線蓮 (T'ieh Hsien Lien; Steel-wire Lotus) (R.M.213). Woody vine; fls. white, VII–IX. fr. IX–X. Central China; locally in An., Ku. Brushland.
4. **Clematis finetiana** Lévl. & Vant. (*C. pavoliniana* Pampan.) (R.M.215). Woody vine; fls. IV; fr. IX–X. China; locally in An., Ki., Ku. Mixed woods.
5. **Clematis apiifolia** DC. 女萎 (Nü Wei; Female Luxuriant-plant) (R.M.217). Woody vine; fls. white, VII–IX; fr. IX–X. Japan, China; locally in An., Che., Ki., Ku. Brushland.
6. **Clematis chinensis** Retz. 威靈仙 (Wei Ling Hsien; Luxuriant Efficacious Fairy) (R.M.216). Woody vine; fls. white, VI–IX; fr. IX–X. Central China to Indo-China; locally in An., Ki., Ku. Mixed forest.
7. **Clematis paniculata** Thunb. 大蓼 (Ta Liao; Noble Polygonum) (R.M.216). Woody vine; fls. white, V–VII; fr. VIII–IX. Japan, Korea, eastern China; locally in An., Che., Ki., Ku. Open woods.
8. **Clematis uncinata** Champ. 毛鉄線蓮 (Mao T'ieh Hsien Lien; Hairy Clematis) (R.M.216). Climbling woody vine; fls. white, VII; fr. VIII–IX. China; locally in An., Che., Ki. Thickets.
9. **Clematis brevicaudata** DC. var. **lissocarpa** Rehd. & Wils. (R.M.218). Woody vine; fls. VIII; fr. IX. China; locally in An., Ki. Woodland.
10. **Clematis grata** Wall. 大木通 (Ta Mu T'ung; Noble Akebia) (R.M.218). Woody vine; fls. white, VI–VIII; fr. VII–IX. Temperate eastern Asia; locally in An., Ki. Mixed forest.

2. **Paeonia** Linn. Peony 牡丹属 (Mu Tan Shu)

Tall *herbs or shrubs*: lvs. large, alternate, cleft or divided: *fls. large* and showy;

sepals 5; petals and stamens indefinite; carpels 2–5, becoming *follicles*. 35 species, in the northern hemisphere; 5 or more in China. (The Latin name, said to commemorate a physician, *Paeon*.)

KEY TO THE SPECIES

Stems herbaceous: follicles not tomentose ..... 1. *P. lactiflora*
Stems woody: follicles densely hairy..... 2. *P. suffruticosa*

1. **Paeonia lactiflora** Pall. 芍藥 (Shao Yao) (B.M.406). Bushy herb, to 1 m.; fls. red, V. Siberia, China, Japan; locally in Ku. Cultivated, ornamental.
2. **Paeonia suffruticosa** Andr. TREE PEONY 牡丹 (Mu Tan; Male Red) (R.M.204). Woody at base, to 1 m.; fr. VII–VIII. Northwest China; locally in Ku. Cultivated, ornamental. Fig. 105.

3. **Anemone** Linn. WINDFLOWER 白頭翁屬 (Pai T'ou Wêng Shu; Hoary-headed-old-man Genus)

Perennial herbs: stem lvs. forming an involucre which may resemble a calyx or may be remote from the fls.: peduncles 1-fld., solitary or in umbels; perianth petaloid; *petals none*; carpels becoming *achenes*. About 90 species, in temperate and cold regions; about 20 in China. (The Greek name, modified from *Na'man*, the Semitic name for *Adonis*, from whose blood a crimson-fld. species of the Orient is said to have sprung.)

KEY TO THE SPECIES

Plants densely silky-hairy: styles 4–8 dm. long in fr., filiform, tomentose. 1. *A. chinensis*
Plants glabrous or pubescent: styles not filiform or plumose.
Fls. 1–3 cm. across, usually with 4–7 perianth segments ..... 2. *A. flaccida*
Fls. 4–8 cm. across, with numerous perianth segments ..... 3. *A. hupehensis*

1. **Anemone chinensis** Bunge 毛頭花 (Mao T'ou Hua; Hairy-headed Flower) (Mak. F.562). Herb, 2–4 dm. high; fls. violet, III–IV; fr. V; styles persistent, plumose. China; locally in An., Ki., Ku. Open grassland. Fig. 106.
2. **Anemone flaccida** F. Schmidt 鵝掌草 (É Chang Ts'ao; Goose-foot Herb) (Mak.F. 559). Slender herb, 1–2 dm. high; fls. white, IV, small. Northeastern Asia; locally in Ku. Moist places.
3. **Anemone hupehensis** Lem. 秋牡丹 (Ch'iu Mu Tan; Autumn Peony) (B.M.397). Brg. herb, to 1 m.; fls. red, VIII–X; plants tall. China; locally in An., Che., Ki., Ku. Mixed woods.

4. **Ranunculus** Linn. BUTTERCUP 毛茛屬 (Mao Kên Shu)

Herbs with alternate lvs.: fls. usually yellow, though sometimes white or red; sepals deciduous; *petals present*, with a *nectariferous* pit and *scale* at the base; carpels many, becoming a head-like cluster of achenes. About 300 species, widely distributed in temperate and cold regions; 40 in China. (The diminutive of the Latin term *rana*, frog, referring to the fact that many species grow in marshes where frogs are abundant.)

KEY TO THE SPECIES

a. Petals white: plant submersed, except the fls.: lvs. finely dissected. 1. *R. aquatilis*
aa. Petals yellow: plants not submersed.
b. Plants entirely glabrous.

Annual, up to 1 m. high: fls. 0.5–1 cm. across: frtg. head oblong; achenes numerous ..... 2. *R. sceleratus*
Perennial from fascicled roots, up to 2 dm. high: fls. 1–1.5 cm. across: frtg. head ovoid to spherical; achenes 5–20.
Plant prostrate, stoloniferous, growing in rice fields: roots elongated ..... 3. *R. polii*
Plant ascending, not stoloniferous, growing in grassland: roots short and thick ..... 4. *R. ternatus*
bb. Plants more or less pubescent.
c. Lvs. definitely trifoliolate ..... 5. *R. cantoniensis*
cc. Lvs. 3-cleft, but not entirely divided ..... 6. *R. acris*

1. **Ranunculus aquatilis** Linn. Common White Water Crowfoot 水毛茛 (Shui Mao Kên) (G.M.7th 394). Submersed aquatic herb; fls. white, V–VII. Eurasia and North America; locally in Che., Ku. Ponds and lakes.
2. **Ranunculus sceleratus** Linn. Celery-leaved Crowfoot 石龍芮 (Shih Lung Jui; Stone-dragon Plant) (G.M.650). Erect herb, 5–10 dm. high; fls. yellow, III–IV; fr. green, IV. Eurasia and North America; locally in An., Che., Ku. In or near water.
3. **Ranunculus polii** Franch. (F.H.E.1:15). Prostrate herb; fls. yellow, IV; lower lvs. 3-parted. China; locally in Ku. Rice fields.
4. **Ranunculus ternatus** Thunb. 小毛茛 (Hsiao Mao Kên; Small Ranunculus) (Mosc. B.54(1):3). Spreading herb, 2–5 dm. high; fls. yellow, III; roots fascicled, fleshy. Japan, China; locally in Ku. Grassland.
5. **Ranunculus cantoniensis** DC. 回回蒜 (Hui Hui Suan; Moslem Garlic) (DC.P.1:43). Erect herb; fls. yellow, VI; fr. VII; frtg. head oblong. Eastern Asia; locally in An., Che., Ki., Ku. Moist places.
6. **Ranunculus acris** Linn. Tall Buttercup 毛茛 (Mao Kên) (G.M.655). Erect herb, 2–5 dm. high; fls. yellow, IV–VII. Eurasia; locally in An., Che., Ki., Ku. Roadsides and grasslands.

5. **Thalictrum** Linn. Meadow Rue 唐松草屬 (T'ang Sung Ts'ao Shu; Boastful-green-herb Genus)

Erect perennial herbs: *lvs.* alternate, *ternately decompound*: *fls.* small and numerous, often unisexual, *without petals*; carpels; few, becoming *achenes*, sometimes stalked or winged. About 90 species, mostly of the north temperate zone; 12 or more in China. (A Greek name.)

Key to the Species

a. Carpels long-stipitate ..... 1. *T. fortunei*
aa. Carpels sessile or nearly so.
Lfts. 15–60 mm. broad, nerved below ..... 2. *T. actaeafolium*
Lfts. 5–25 mm. broad.
Lfts. round in outline at the tip, glaucous beneath, dentate rather than serrate ..... 3. *T. argyi*
Lfts. cuneate-oblong-lanceolate-linear, narrower above, nerved below ..... 4. *T. simplex*

1. **Thalictrum fortunei** S. Moore (BSBF 50:612). Bushy herb, 3–6 dm. high; fls. white, IV–VII; fr. VII–VIII. Central China; locally in An., Che., Ki. Damp places. Fig. 107.

2. **Thalictrum actaeafolium** Sieb. & Zucc. 紫銀唐松草 (Tzŭ Ying T'an Sung Ts'ao; Purple-silver Thalictrum) (Mak.F.564). Erect herb, to 1 m.; fls. white or pinkish, VII–IX. Japan, China; locally in An., Che., Ki. Mixed woods.
3. **Thalictrum argyi** Lévl. & Vant. (Bu.H.B.2ser.6:504). Erect herb, 5–6 dm. high; fls. white, IV–V. China; locally in An., Ki., Ku. Brushland.
4. **Thalictrum simplex** Linn. 黃唐松草 (Huang T'ang Sung Ts'ao; Yellow Thalictrum) (Mak.F.563). Erect herb, to 1.5 m.; fls. V; fr. VI. Eurasia; locally in An., Ku. Moist thickets.

6. **Semiaquilegia** Mak. 天葵属 (T'ien K'uei Shu)

Smooth *slender herbs* with *ternately decompound lvs.* and small white *regular fls.*: sepals deciduous; petals sometimes very small, or wanting; carpels 2–20, becoming *follicles*. 7 species, in north temperate regions; 4 in China. (Related to *Aquilegia*.)

1. **Semiaquilegia adoxoides** (DC.) Mak. (*Isopyrum adoxoides* DC.) (T'ien K'uei; Heavenly Mallow) (Mak.F.567). Slender herb, 1–4 dm. high; fls. white, III–IV; fr. IV–V; petals saccate at base. China, Japan; locally in An., Che., Ki., Ku. Shaded woods. Fig. 108.

7. **Aquilegia** Linn. Columbine 耧斗菜花属 (Lou Tou Ts'ai Hua Shu)

Erect *brg. perennial herbs* with *ternately decompound lvs.*: *fls.* large and showy, *regular*, the *petals forming long spurs*; sepals petaloid; carpels 5, becoming *follicles*. About 50 species, in the north temperate zone; 2 or more in China. (A Latin name; by some derived from *aquila*, the eagle, from supposed resemblance of the curved spurs to claws; by others derived from *aqua*, water, and *legere*, to collect, referring to the liquid at the base of the hollow spurs.)

1. **Aquilegia flabellata** Sieb. & Zucc. 耧斗菜 (Lou Tou Ts'ai; Sowingbox Herb) (B.M.402). Brg. herb, 5–10 dm. high; fls. purple, V–VIII. Japan; locally in Ku. Cultivated, ornamental. Fig. 109.

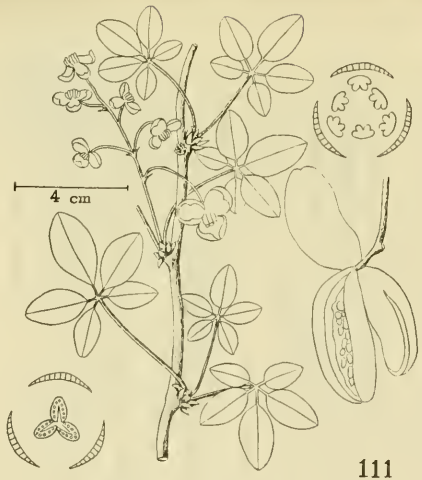
8. **Delphinium** Linn. Larkspur 飛燕草属 (Fei Yen Ts'ao Shu)

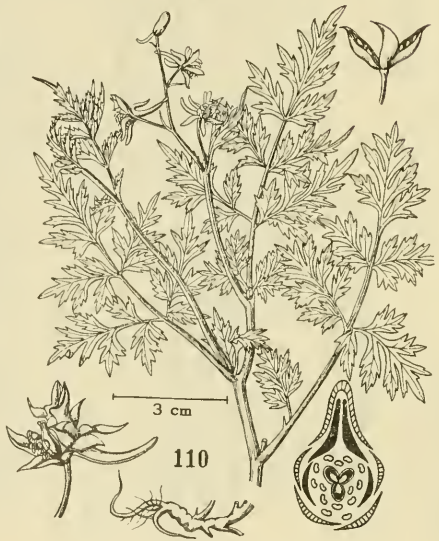
Erect *brg. herbs* with *palmately lobed or divided lvs.* and showy *irregular fls.*: *sepals petaloid, one* of them *prolonged into a spur*, enclosing 2 petals: carpels few, becoming *follicles*. About 250 species, in the north temperate zone; 10 or more in China. (Latin: *delphin*, or dolphin, on account of the supposed resemblance of the fls. to a dolphin.)

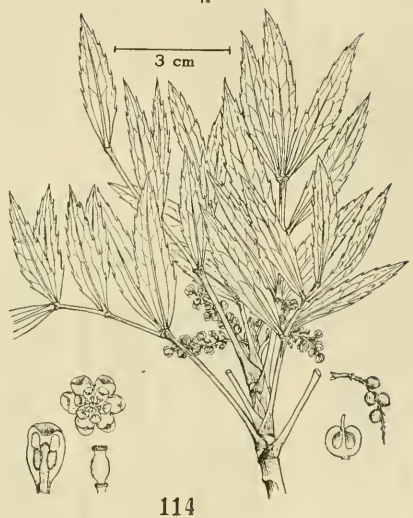
Key to the Species

Lvs. pinnately compound: fls. about 2 cm. across, white and purple. 1. *D. anthricifolium*
Lvs. palmately multi-parted: fls. larger, white or blue..... 2. *D. grandiflorum*

1. **Delphinium anthricifolium** Hance 還亮草 (Huan Liang Ts'ao; Returning-brightness Herb) (I.P.O.1:t.63). Slender herb, 2–5 dm. high; fls. bluish purple, IV–VI. China; locally in An., Ku. Moist shade. Fig. 110.
2. **Delphinium grandiflorum** Linn. Bouquet Larkspur 飛燕草 (Fei Yen Ts'ao; Flying-swallow Herb) (B.M.399). Brg. herb, to 1 m.; fls. blue, V. Siberia, China; locally in An., Ku. Mountain meadows.







109. Aquilegia flabellata
110. Delphinium anthricifolium

111. Akebia quinata
112. Berberis thunbergii

113. Epimedium sagittatum
114. Mahonia fortunei

9. **Aconitum** Linn. Monkshood 烏頭属 (Wu T'ou Shu; Black-head Genus)

Perennial herbs with *palmately lobed or divided lvs.* and showy *irregular fls.*: *sepals petal-like, one* of them *forming a* large *hood* enclosing two petals: carpels 3–5, becoming follicles. About 100 species, in cool parts of the north temperate zone; 10 in China. (The Greek name.)

Key to the Species

Stems erect, robust, 1–2 m. high: fls. bluish purple without, whitish within; posterior sepal a hood.
Pedicels crisp-recurved-pubescent; helmet 20–30 mm. high; sepals and carpels usually pubescent ..... 1. *A. carmichaelii*
Pedicels spreading-glandular-pubescent; helmet 15–20 mm. high; sepals and carpels glabrous ..... 2. *A. chinense*
Stems flexuous, twining: fls. whitish; posterior sepal a conical spur.. 3. *A. finetianum*

1. **Aconitum carmichaelii** Debx. (*A. kusnetzoffii* Reichb. var. *bodinieri* Lévl. & Vant.) 独白草 (Tu Pai Ts'ao; The-only-white Herb) (B.G.6:488). Erect herb, to 1 m.; fls. bluish purple, VIII–IX; fr. IX–X; sepals somewhat soft-hairy. China; locally in An., Che., Ki., Ku. Brushy slopes.
2. **Aconitum chinense** Paxt. (*A. uncinatum* var. *japonicum* Fin. & Gagn., non (Thunb.) Regel.) 草烏頭 (Ts'ao Wu T'ou: Herbaceous Aconitum (B.G.6:493; Go. A.13:115). Erect herb, to 2 m.; fls. bluish purple, VIII–IX; fr. IX–X. Eastern and northern China; locally in An., Che., Ku. Woodland shade.
3. **Aconitum finetianum** Hand.-Mazz. (*A. lycoctonum* Linn. var. *volubile* Fin. & Gagn.) 牛扁 (Niu Pien) (Go.A.13:80). Twining herb; fls. pale yellow and purple, VIII–IX; fr. IX–X. Eurasia; locally in Ki. Mountain meadows.

61. **LARDIZABALACEAE** Lardizabala Family 木通科 (Mu T'ung K'o)

Woody vines with alternate compound lvs.: fls. regular, often unisexual, *without petals*; sepals petal-like, 6 or 3; stamens 6; carpels usually 3, becoming *large berries*. 8 genera and over 20 species, in eastern Asia and Chile; 6 genera and about 20 species in China.

Key to the Genera

Lvs. deciduous: sepals 3 ..... 1. *Akebia*
Lvs. evergreen: sepals 6 ..... 2. *Holboellia*

1. **Akebia** Decne. 木通属 (Mu T'ung Shu)

Deciduous (occasionally half-evergreen) twiners with digitate lvs.: fls. monoecious, in axillary racemes, the pistillate at the base of the infl.; *sepals 3*; carpels 3–12. Two species, in eastern Asia. (From *Akebi*, the Japanese name.)

Key to the Species

Lfts. 5, entire ..... 1. *A. quinata*
Lfts. 3, margins sinuate or entire ..... 2. *A. trifoliata*

1. **Akebia quinata** Decne. 木通 (Mu T'ung) (R.M.221). Woody vine; fls. reddish purple, IV–V; fr. VIII–X. Central China, Korea, Japan; locally in An., Ku. Woods and roadsides. Fig. 111.
2. **Akebia trifoliata** (Thunb.) Koidz. (*A. lobata* Decne.) 三葉木通 (San Yeh Mu

T'ung) (R.M.221). Woody vine; fls. V; fr. VIII–X. Central China to Japan; locally in An., Ki. Mixed woods.

2. **Holboellia** Wall. 牛姆瓜属 (Niu Mu Kua Shu: Cow Quince Genus)

Evergreen twiners with digitate lvs.: monoecious: fls. in axillary racemes; *sepals 6*, fleshy. 5 species, in eastern Asia; most of them occurring in China. (After F. L. Holboell, Danish botanist.)

1. **Holboellia coriacea** Diels 鷹爪枫 (Ying Chao Fêng; Eagle-clawed Liquidambar) (R.M.221). Woody vine; fls. IV; fr. VII–IX. Central China; locally in An., Che., Ki. Brushland.

62. SARGENTODOXACEAE 大血藤科 (Ta Hsüeh T'êng K'o)

Deciduous twining shrub with alternate long-petioled trifoliolate lvs. and deciduous campanulate fls. in pendulous racemes; sepals 6, petaloid; nectaries 6, very small; stamens 6: *fr. an ovoid receptacle* with *numerous stalked* subglobose *berry-like one-seeded carpels*. One monotypic genus, in China.

1. **Sargentodoxa** Rehd. & Wils. 大血藤属 (Ta Hsüeh T'êng Shu)

Characters of the family. (After C. S. Sargent, director of the Arnold Arboretum; 1841–1927; Greek: *doxe*, glory.)

1. **Sargentodoxa cuneata** (Oliv.) Rehd. & Wils. 大血藤 (Ta Hsüeh T'êng; Great Blood Vine) (R.M.222). Twining shrub; fls. VII; fr. VIII. China; locally in An. Forest.

63. BERBERIDACEAE Barberry Family 小蘗科 (Hsiao Nieh K'o)

Shrubs or herbs with *alternate lvs.*: *fls. perfect*; sepals and *petals* usually in two rows and overlapping; stamens opposite the petals; *anthers usually opening by two valves*; carpel one, becoming a berry or capsule. 10 genera with 250 species, widely distributed, especially in the northern hemisphere; 7 genera and over 50 species in China.

Key to the Genera

A.	Lvs. simple: spiny shrubs	1. *Berberis*
AA.	Lvs. Compound: plants not spiny.	
	Herbs: leaves ternately compound	2. *Epimedium*
	Shrubs.	
	Lvs. simply (once) pinnately compound; lfts: toothed	3. *Mahonia*
	Lvs. thrice pinnately compound; lfts. entire	4. *Nandina*

1. **Berberis** Linn. Barberry 小蘗属 (Hsiao Nieh Shu)

Spiny shrubs with yellow wood and *simple* or one-foliolate *lvs.*: *stamens 6*, sensitive to shock; anther valves hinged at the top; fls. pale yellow, in drooping racemes: *fr. a berry*: the spines are modified lvs. About 175 species; 40 or more in China. (From "Berberys", the Arabic name of the fruit.)

Key to the Species

Lvs. serrate or spiny-dentate: fls. 10-20, in long racemes	1.	*B. henryana*
Lvs. entire: fls. solitary, or in short racemes or umbel-like clusters		
Lvs. oblong-rhomboid, 3-10 cm. long: spines 4-5 cm. long	2.	*B. virgetorum*
Lvs. spatulate or obovate, 1-3 cm. long: spines 0.5-2 cm. long	3.	*B. thunbergii*

1. **Berberis henryana** Schneid. (R.M.240). Shrub, to 2 m.; fr. red, VIII–X. Central China; locally in An. Woodland.
2. **Berberis virgetorum** Schneid. 土黃連 (Tu Huang Lien; Local Coptis) (Pl.W.3:440). Shrub, 1–1.5 m. high; fr. VIII. Central China; locally in Che., Ki. Brushland.
3. **Berberis thunbergii** DC. 小檗 (Hsiao Nieh; Small Pterocarpus) (R.M.237). Shrub, to 1 m.; fls. pale greenish yellow, IV. Japan; locally in Ku. Cultivated, ornamental. Fig. 112.

2. **Epimedium** Linn. 淫羊藿屬 (Yin Yang Ho Shu)

Herbs with ternately compound lvs.: sepals 8, petal-like; petals 4, hooded or spurred; *stamens 4*: *capsule* 2-valved, few-seeded. About 10 species, in Eurasia; 3 in China. (Greek: *epi*, upon; *Medion*, *Media*, applied to a plant said to grow in Media.)

Key to the Species

Infl. paniculate: lfts. sagittate	1. *E. sagittatum*
Infl. racemose: lfts. cordate-ovate, unequal at the base	2. *E. macranthum*

1. **Epimedium sagittatum** (Sieb. & Zucc.) Baker 淫羊藿 (Yin Yang Huo) (Mak. F. 546). Erect herb; fls. IV–V. China, Japan; locally in An., Che., Ki. Forest. Fig. 113.
2. **Epimedium macranthum** Morr. & Decne. (Mak. F. 545). Perennial herb; fls. VI. China, Japan; locally in Ki., Ku. Woodland.

3. **Mahonia** Nutt. 十大功勞屬 (Shih Ta Kung Lao Shu)

Evergreen shrubs with pinnately compound lvs.: brs. not spiny, but lfts. often bristle-tipped: *fls. yellow*, in racemes; sepals 9; petals 6: *fr. a berry*, usually dark blue and bloomy. About 50 species; 20 in China. (After Bernard M'Mahon, 1775–1816, American horticulturist.)

Key to the Species

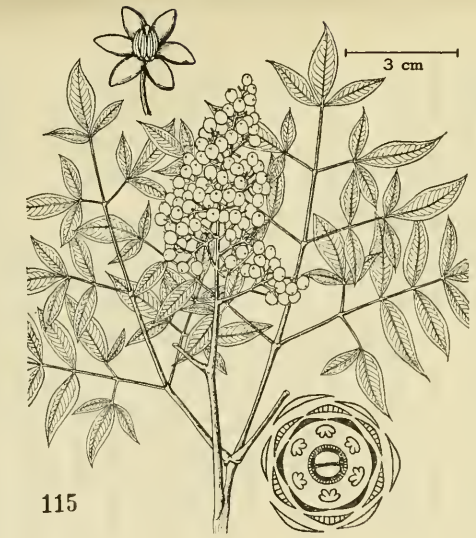
Lfts. rounded or truncate at the base, ovate to oblong	1. *M. bealii*
Lfts. cuneate at the base, lanceolate	2. *M. fortunei*

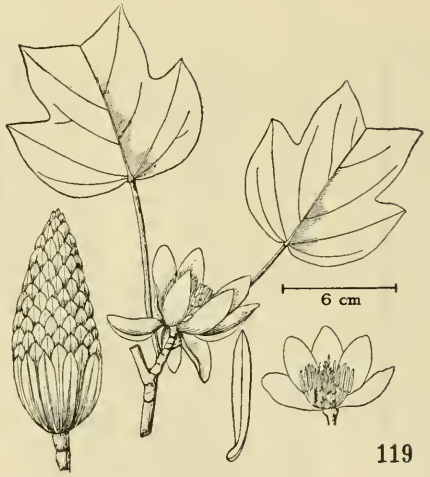
1. **Mahonia bealii** (Fort.) Carr. 濶葉十大功勞 (K'uo Yeh Shih Ta Kung Lao; Broad-leaf Mahonia) (R.M. 225). Shrub, to 1 m.; fls. yellow, III. China; locally in An., Ku. Brushland and cultivated, ornamental.
2. **Mahonia fortunei** (Lindl.) Fedde 十大功勞 (Shih Ta Kung Lao; Ten-great-virtues) (R.M. 225). Shrub, to 2 m.; fls. dark purple, III. China; locally in Che., Ku. Cultivated, ornamental. Fig. 114.

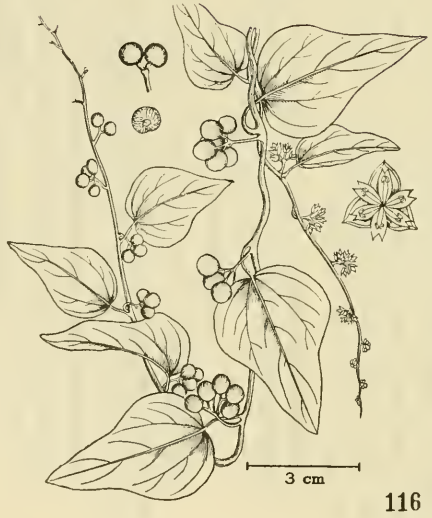
4. **Nandina** Thunb. 南天竹屬 (Nan T'ien Chu Shu)

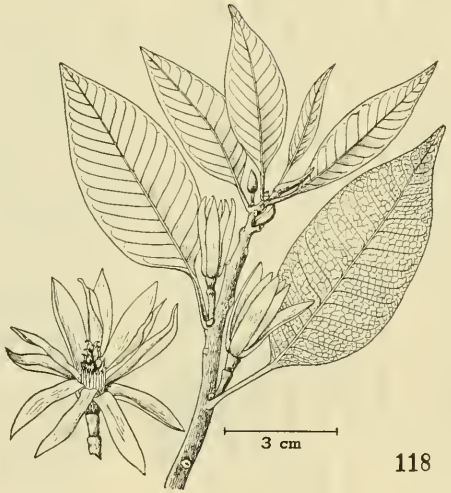
Evergreen shrubs with ternately compound lvs.: lfts. entire: *fls. white*, in large terminal panicles; anthers opening by longitudinal slits: *fr. a* globular *berry*. One species. (The Japanese name.)

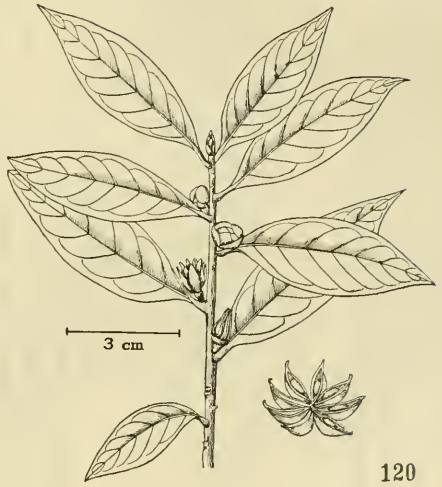
1. **Nandina domestica** Thunb. Heavenly Bamboo 南天竹 (Nan T'ien Chu; Southern Nandina) (R.M. 223). Shrub, 1–2 m. high; fls. white, VII; fr. red, X–XI; lvs. 3×pinnately compound. Central China to Japan; locally in An., Che., Ki., Ku. Cultivated, ornamental. Fig. 115.











115. Nandina domestica
116. Cocculus trilobus

117. Magnolia denudata
118. Michelia champaca

119. Liriodendron chinense
120. Illicium lanceolatum

64. **MENISPERMACEAE** Moonseed Family 防己科 (Fang Chi K'o)

Twining dioecious *vines* with alternate *simple*, usually palmately veined *lvs.*: fls. small, in axillary clusters; carpels usually 3, each becoming a curved drupe with a *curved* or crescent-shaped sculptured *endocarp*. About 65 genera with 200 species; 8 genera and over 10 species in China.

Key to the Genera

A. Lvs. not peltate.
- Lvs. ovate to ovate-oblong, 4–9 cm. long, entire and obtuse or 3-lobed: style cylindric, with lateral stigma: drupe ovoid or subglobose; stone compressed, laterally ribbed ..... 1. *Cocculus*
- Lvs. broad-ovate, 6–15 cm. long, entire and acuminate (sometimes abruptly and briefly so) or 5–7-lobed: style recurved, with lobulate stigma: stone curved, with a tubercled dorsal rib and numerous transverse ribs..... 2. *Sinomenium*

AA. Lvs. peltate.
- Carpels 2–4: lvs. lobed ..... 3. *Menispermum*
- Carpel 1: lvs. usually entire ..... 4. *Stephania*

1. **Cocculus** DC. 青藤属 (Ch'ing T'êng Shu)

Twining *shrubs*, the brs. often herbaceous: lvs. ovate to ovate-oblong, 4–9 cm. long, entire and obtuse or 3-lobed: fls. in panicles or racemes; sepals and petals 6; style cylindric, with lateral stigma: drupe ovoid or subglobose; stone of the fr. compressed and laterally ribbed. 11 species, in Asia, Africa, North America, the Hawaiian Islands; 3 in China. (Greek: latinized diminutive of *kokkos*, berry.)

1. **Cocculus trilobus** (Thunb.) DC. 青藤 (Ch'ing T'êng; Green Vine) (R.M. 243). Trailing woody vine; fls. VI–VIII; fr. bluish purple, VII–IX. China, Japan, Philippine Islands; locally in An., Che., Hon., Ki., Ku. Brushland. Fig. 116.

2. **Sinomenium** Diels 防己属 (Ch'in T'êng Shu)

Deciduous twining vine, woody at the base: lvs. long-petioled; the petioles angled sharply at the base; blades broad-ovate, palmately lobed or entire and acuminate (sometimes abruptly and briefly so) 6–15 cm. long: fls. in large panicles; sepals and petals 6; male fls. with 9–12 stamens; pistillate fls. with 3 carpels and 9 staminodes; style recurved with lobulate stigma: *stone* of drupe curved, *with a tubercled dorsal rib* and numerous transverse ribs. One species, in eastern Asia. (Latin: *Sinae*, Chinese, and Greek: *mensis*, moon, meaning Chinese Moonseed.)

1. **Sinomenium acutum** (Thunb.) Rehd. & Wils. (R.M. 243). Twining vine; fls. VI; fr. X. Japan, Central China; locally in An., Che., Hup., Ki, Brushland.

3. **Menispermum** Linn. Moonseed 蝙蝠葛属 (Pien Fu Ko Shu)

Climbing vines (ours apparently herbaceous) with lobed *peltate lvs.*: sepals 4–10; petals 6–9; *carpels 2–4*: stone of the drupe crescent-shaped. 2 species, one in eastern Asia and one in eastern North America. (Greek: *men*, moon; and *sperma*, seed.)

1. **Menispermum dahuricum** DC. 蝙蝠葛 (Pien Fu Ko; Bat Pueraria) (R.M. 244). Herbaceous vine; fls. IV; fr. VII. Eastern Asia; locally in An., Ku. Brushland.

4. **Stephania** Lour. 千金藤属 (Ch'ien Chin T'êng Shu)

Climbing vines (ours apparently herbaceous) with *peltate lvs.*: fls. in axillary cymose umbels; sepals; 3–10; petals 3–5; *carpel 1*: stone of the drupe crescent-shaped.

About 30 species, mostly in the Old World tropics: 3 or more in China. (Greek: *stephanos*, a crown or garland.)

Key to the Species

Staminate fls. in umbel-like clusters; stamens 6 ..... 1. *S. japonica*
Staminate fls. in heads; heads arranged in racemes; stamens 4 ..... 2. *S. tetrandra*

1. **Stephania japonica** (Thunb.) Miers 千金藤 (Ch'ien Chin T'eng; A-thousand-ounces-of-gold Vine) (Mak. F. 543). Herbaceous vine; fls. VI–VII; fr. reddish brown, VIII. Southern and eastern Asia; locally in An., Che., Ki., Ku. Brushland.
2. **Stephania tetrandra** Moore 烏龜稍 (Wu Kuei Shao; Turtle Twig) (E.P. 46:282). Herbaceous vine; fls. VI–VII; fr. VIII; lf. blade with mucronulate tip. China, Formosa; locally in An., Che., Ki. Brushland.

65. **MAGNOLIACEAE** Magnolia Family 木蘭科 (Mu Lan K'o)

Woody plants with *alternate simple lvs.*: *fls. solitary*, fragrant, usually perfect; sepals and petals often similar; *carpels many*, often on an elongated receptacle, becoming in fr. follicles, samaras or berries. 10 genera with about 80 species, in temperate and subtropical Asia and North America; 9 genera and about 45 species in China.

Key to the Genera

A. Carpels not winged, becoming follicles.
  Carpel-bearing receptacle sessile within the fl.
    Ovules 1-2 in each carpel; carpels 1-2-seeded ..... 1. *Magnolia*
    Ovules many in each carpel; carpels 6- or more-seeded ..... 2. *Manglietia*
  Carpel-bearing receptacle stalked within the fl. ..... 3. *Michelia*
AA. Carpels winged, becoming samaras: lvs. truncate ..... 4. *Liriodendron*

1. **Magnolia** Linn. 木蘭屬 (Mu Lan Shu)

Trees or shrubs with large entire lvs. and conspicuous showy *terminal fls.*: fl. bud enclosed in a stipular spathe; carpels aggregated on a *sessile receptacle*, forming follicles at maturity. About 35 species, in North and Central America and eastern Asia; 15 in China. (After Pierre Magnol, 1638–1715, French botanist.)

Key to the Species

a. Lvs. evergreen, firmly coriaceous, pubescent or glaucous beneath: fls. 15-20 cm. across.
  Shrub or small tree: lvs. slightly glaucous beneath ..... 1. *M. coco*
  Tree: lvs. ferrugineous-pubescent beneath ..... 2. *M. grandiflora*
aa. Lvs. deciduous, pubescent on the veins beneath: fls. appearing before the lvs., 10-15 cm. across.
  b. Fls. appearing with the leaves ..... 3. *M. officinalis*
  bb. Fls. appearing before the leaves.
    c. Sepals 3, distinct from the purple petals: shrubs ..... 4. *M. liliflora*
    cc. Sepals and petals alike: trees or shrubs.
      Perianth segments narrow, oblong to lanceolate, 12-18 .. 5. *M. stellata*
      Perianth segments broad, spatulate to obovate, about 9.
        Perianth segments white, oblong-ovate ..... 6. *M. denudata*
        Perianth segments purplish outside, spatulate..... 7. *M. zenii*

1. **Magnolia coco** (Lour.) DC. 香港玉蘭 (Hsiang Kan Yü Lan; Hongkong Magnolia)

(Lee 474). Evergreen shrub or small tree. South China; locally in Ki. Planted, ornamental.

2. **Magnolia grandiflora** Linn. Bull Bay 洋玉蘭 (Yang Yü Lan; Foreign Magnolia) (R.M. 249). Tree, 15 m. high; fls. white, V–VIII. Eastern North America; locally in Che., Ku. Planted, ornamental.
3. **Magnolia officinalis** Rehd. & Wils. var. **biloba** Rehd. & Wils. 廬山厚朴 (Lü Shan Hou P'u) (R.M. 248). Tree, to 10 m.; lvs. deeply emarginate or 2-lobed. Eastern and central China; locally in An., Ki. Planted, medicinal.
4. **Magnolia liliflora** Desr. 木蘭 (Mu Lan; Woody Orchid) (R.M. 250). Shrub, to 3 m.; fls. reddish purple, IV; sepals greenish. China; locally in An., Ku. Planted, ornamental.
5. **Magnolia stellata** Maxim. var. **rosea** Veitch Starry Magnolia 重華辛夷 (Ch'ung Hua Hsin I) (R.M. 252). Shrub, to 1 m.; fls. pink or white, III–IV. Introduced from Japan; locally in Ku. Planted, ornamental.
6. **Magnolia denudata** Desr. 玉蘭 (Yü Lan; Jade Orchid) (R.M. 251). Tree, to 10 m.; fls. white, fragrant, III–IV; fr. VII. Central China; locally in An., Che., Ki., Ku. Planted, ornamental. Fig. 117.
7. **Magnolia zenii** Cheng 宝華玉蘭 (Pao Hua Yü Lan) (Sc. C. 8:291). Small tree, 5–7 m. high; fls. III. China; locally in Ku. Woodland.

2. **Manglietia** Blume 木蓮属 (Mu Lien Shu)

Trees or shrubs with perfect or polygamous fls.: lvs. usually reticulate on both sides: fls. subtended by spathe-like bracts a short interval below: *fr. ovoid* or oblong-ovate, many-seeded. 10 species, in the mountains of southern Asia; 5 in China. (From *Manglet*, the name of *M. glauca* in Java.)

1. **Manglietia fordiana** (Hemsl.) Oliv. 木蓮 (Mu Lien; Woody Lotus) (Chen 297). Tree, to 13 m.; fr. VIII; carpels several-seeded. China; locally in An. Temple woodland.

3. **Michelia** Linn. 白蘭花属 (Pai Lan Hua Shu)

Trees or shrubs with *axillary fls.*: carpels on a *stalked* elongated receptacle, forming follicles. About 15 species, in eastern Asia; 10 in China. (After R.A. Micheli, 1679–1737, an Italian botanist.)

Key to the Species

Brts. brown-hairy: lvs. 5–10 cm. long: fls. brownish purple ..... 1. *M. figo*
Brts. glabrous: lvs. 12–20 cm. long: fls. pale yellow ..... 2. *M. champaca*

1. **Michelia figo** (Lour.) Spreng. (*M. fuscata* Blume) Banana Shrub 含笑花 (Han Hsiao Hua; Smiling Flower) (B.M. 417; M.L. 159). Tree, to 5 m.; fr. VII–VIII. China; locally in An., Ki. Planted, ornamental.
2. **Michelia champaca** Linn. 白蘭花 (Pai Lan Hua; White-orchid Flower) (B.M. lst. 291). Shrub, to 2 m.; fls. pale yellow, fragrant, VI–IX. Introduced from Himalayas; locally in Ku. Planted. ornamental. Fig. 118.

4. **Liriodendron** Linn. Tulip Tree 鵝掌楸属 (È Chang Ch'iu Shu)

Deciduous trees: *lvs. truncate at the apex*: fls. large, terminal and solitary; *carpels* in a cone-like aggregation on an elongated receptacle, *becoming samaras*.

Two species, one in China and one in eastern North America. (Greek: *lirion*, lily; and *dendron*, tree.)

1. **Liriodendron chinense** Sarg. Chinese Tulip Tree 鵝掌楸 (Ê Chang Ch'iu; Goose-foot Catalpa) (R.M. 253). Tree, to 15 m.; fls. yellow and pink, V–VI; fr. VII–X. Central China; locally in Che., Ki. Forest or cultivated. Fig. 119.

66. SCHISANDRACEAE Schisandra Family 北五味子科 (Pai Wu Wei Tzŭ K'o)

Woody vines with alternate exstipulate lvs.: fls. unisexual, hypogynous; perianth segments few to many, essentially similar (ours); stamens 4–80; anthers dehiscent by longitudinal clefts: *filaments fused*, at least at the base, *into a modified column*; carpels 12–300, on a modified receptacle, each with 2–5 ovules: *fr.* aggregate and *baccate*, composed of a modified torus and sessile drupe-like 1–5-seeded carpels; seeds with copious oily endosperm. Two genera with over 45 species, in eastern Asia, Malaya and eastern North America. Both genera and 15 species in China.

Key to the Genera

Carpels borne in a spike on a cylindric receptacle ..... 1. *Schisandra*
Carpels borne in a head-like cluster on an ovoid sub-clavate or ellipsoid receptacle ..... 2. *Kadsura*

1. Schisandra Michx. 北五味子屬 (Pai Wu Wei Tzŭ Shu; Northern Five-flavored Seed)

Twining shrubs, apparently dioecious: *fls. in* slender-stalked axillary *clusters*, unisexual; *carpels* numerous, along a slender receptacle, forming *in* fr. *a pendulous spike of berries*. 25 species, mostly in eastern Asia; one in North America and 17 in China. (Greek: *schizein*, to cleave; and *andros*, man; referring to the cleft anthers of the type species.)

Key to the Species

Leaf blades elliptic to elliptic-ovate, usually broadest near or above the middle, 5–11 × 3–7 cm. drying brownish; veinlet reticulation inconspicuous: perianth segments usually elliptic to oblong-obovate, longer than broad: carpels 30–50: testa smooth or rarely rugulose dorsally: Central China ..... 1. *S. sphenanthera*
Leaf blades ovate-elliptic, usually broadest below the middle, 6-14 × 3.5–7 cm., drying green or olivaceous; veinlet reticulation prominent: perianth segments broadly elliptic to suborbicular, nearly as broad as long: carpels about 25: testa rugulose to tuberculate: eastern and southeastern China..... 2. *S. viridis*

1. **Schisandra sphenanthera** Rehd. & Wils. 華中五味子 (Hua Chung Wu Wei Tzŭ; Central China Five-flavored Seed) (R.M. 254). Woody vine; fls. orange, V–VI; fr. red, VIII–X. Central and western China; locally in An., Hup., Ki., Ku. Forest.

2. **Schisandra viridis** A.C. Sm. (Sa. 7:129). Woody vine; fls. greenish yellow, V–VI; fr. red, VII–IX. Eastern and southeastern China; locally; in An., Che., Ki. Forest.

2. **Kadsura** Juss. 南五味子屬 (Nan Wu Wei Tzŭ Shu; Southern Five-flavored Seed)

Evergreen *twiners*: *fls.* unisexual, *axillary*, usually *solitary*; *carpels becoming berries and forming a globose head.* 22 species, in eastern Asia and Malaysia; 7 in China. (The Japanese name.)

1. **Kadsura longepedunculata** Finet & Gagnep. (*K. peltigera* Rehd. & Wils.) 盤柱南五味子 (P'an Chu Nan Wu Wei Tzŭ; Climbing (twining) Kadsura) (Sarg. 7:183). Woody vine; fls. ivory yellow, VII–VIII; fr. red, X. China; locally in An., Che., Ki., Ku. Forest.

67. ILLICIACEAE Anise Tree Family 茴香科 (Hui Hsiang K'o)

Evergreen aromatic glabrous *shrubs or* small *trees* with alternate entire coriaceous minutely punctate exstipulate lvs.: fls. bisexual, solitary or in axillary clusters of 3's, yellow or purplish; perianth segments 7–33, the inner ones becoming progressively larger than the outer which are often bract-like; stamens 4–50; *carpels 7–15*, free and 1-ovuled, *forming a single whorl*: fr. a star-shaped whorl of woody tardily dehiscent 1-seeded follicles. One genus with over 40 species in southeastern Asia, Malaysia and eastern North America.

1. **Illicium** Linn. Anise Tree 茴香屬 (Hui Hsiang Shu)

Characters of the family. 16 species in China. (Latin: *illicium*, that which entices, referring to the agreeable odor of the plant.)

1. **Illicium lanceolatum** A. C. Sm.* 紅茴香 (Hung Hui Hsiang; Red Foeniculum) (Sarg. 5:43). Shrub, to 2 m.; fls. red, V–VII; fr. VIII–IX, small, usually with 8 carpels. China; locally in An., Ki. Forest. Fig. 120.

* It has seemed to the writer that the differences between this and *I. henryi* Diels, to which our specimens were previously referred, are of varietal rather than specific rank. Dr. Smith (Sarg. 5:44, 64) notes the relationship with *I. henryi* and an overlapping range.

68. CALYCANTHACEAE Calycanthus Family 臘梅科 (La Mei K'o)

Shrubs with aromatic bark and opposite entire lvs.: fls. perfect, solitary; sepals and petals similar, in many series; *carpels numerous, on the inside of an urn-shaped receptacle*, becoming *achenes*. Two genera with 6 species, in eastern Asia and North America; one genus and two species in China.

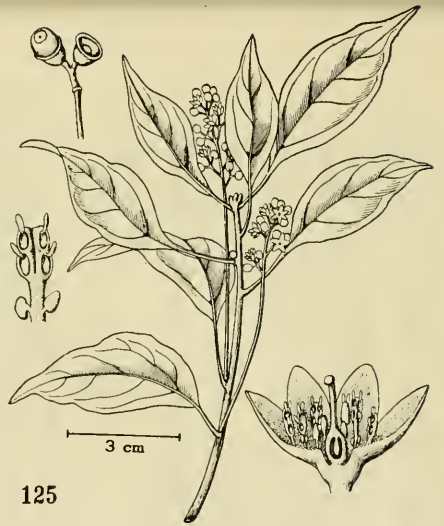
1. **Chimonanthus** Lindl. 臘梅屬 (La Mei Shu)

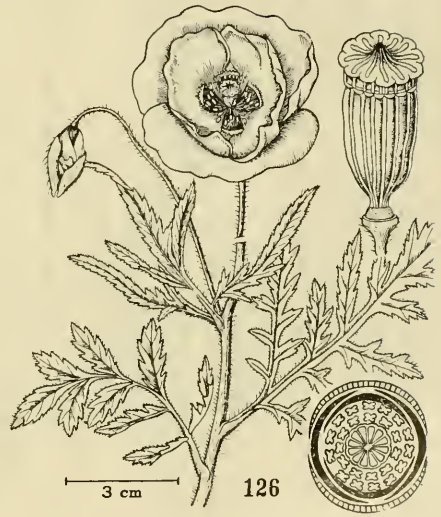
Fls. yellow, appearing *before the lvs.*; *stamens 5 or 6.* Two species, in China. (Greek: *cheimon*, winter; and *anthos*, flower, referring to its flowering during the winter.)

1. **Chimonanthus praecox** (L.) Link 臘梅 (La Mei; Winter Plum) (R.M. 256). Shrub, to 2 m.; fls. yellow, XII–III; fr. VI–VII. China; locally in An., Ku. In woods and planted, ornamental. Fig. 121.

69. LAURACEAE Laurel Family 樟科 (Chang K'o)

Aromatic trees and shrubs with alternate (ours) or opposite *simple lvs.*: *fls.* unisexual or bisexual, *without petals*; perianth usually in two similar whorls; stamens 6–30; *anthers opening by valves*; ovary superior, 1-celled, 1-seeded: fr. a drupe or





121. Chimonanthus praecox
122. Sassafras tzumu

123. Lindera glauca
124. Litsea chinensis

125. Cinnamomum camphora
126. Papaver rhoeas

berry. About 45 genera with 1,000 species, tropical and subtropical; 12 genera and about 100 species in China.

Key to the Genera

A. Fls. in racemes, umbels, or fascicles, rarely solitary: plants mostly dioecious.
  Fls. in short racemes: lvs. usually 3-lobed, 3-nerved from the base: anthers 4-celled ..... 1. *Sassafras*
  Fls. in umbels or fascicles: lvs. mostly entire.
    Anthers 2-celled ..... 2. *Lindera*
    Anthers 4-celled ..... 3. *Litsea*
AA. Fls. in panicles, perfect or polygamo-dioecious: lvs. persistent.
  Lvs. 3-nerved: perianth lobes deciduous in fr. ..... 4. *Cinnamomum*
  Lvs. penninerved: perianth lobes persistent in fr.
    Perianth lobes reflexed in fr..... 5. *Machilus*
    Perianth lobes erect in fr. ..... 6. *Phoebe*

1. **Sassafras** Nees 檫樹屬 (Ch'a Shu Shu)

Deciduous trees: *lvs.* broad, entire or *1–3–lobed* at the apex, and *3–nerved at the base*: fls. polygamous, in clustered racemes, before the lvs.; anthers 4–celled and 4–valved: fr. an ovoid drupe. Two species, one in eastern Asia and one in eastern North America. (Spanish: *salsafras*, the vernacular name applied by the early settlers in Florida.)

1. **Sassafras tzumu** Hemsl. 檫樹 (Ch'a Shu) (R.M. 259). Tree, to 10 m.; fls. IV; fr. orange red, VIII; lvs. 3–lobed. Central China; locally in An., Che., Ki., Ku. Forest. Fig. 122.

2. **Lindera** Thunb. Benzoin 山胡椒屬 (Shan Hu Chiao Shu)

Fls. in lateral sessile involucrate clusters, before the lvs. (in deciduous species); *anthers 2–celled* and 2–valved: fr. a drupe. 60 species, in eastern Asia and North America; about 25 in China. (After John Linder, Swedish botanist.)

Key to the Species

a. Lvs. nerved from the base.
  Lvs. evergreen, coriaceous, 3–7.5 cm. long..... 1. *L. strychnifolia*
  Lvs. deciduous, membranous.
    Lvs. entire; nerves and petioles tinged red ..... 2. *L. rubronervia*
    Lvs. shortly 3-lobed ..... 3. *L. cercidifolia*
aa. Lvs. pinnately veined.
  b. Lvs. cordate, ovate or rounded, 6–11 cm. long: fls. appearing before the lvs. ..... 4. *L. reflexa*
  bb. Lvs. oblong to lanceolate.
    c. Lvs. evergreen, over 15 cm. long: fr. to 22 mm. long .. 5. *L. megaphylla*
    cc. Lvs. smaller: fr. 5–15 mm. long.
      d. Umbels 3–8-fld., axillary.
        Fr. bright red: lvs. scarcely glaucescent beneath 6. *L. erythrocarpum*
        Fr. black or dark purple: lvs. glaucous beneath.
          Winter buds small, 3–5 mm. long: brts. greenish yellow, glabrous: pedicels 3–6 mm. long.... 7. *L. angustifolia*
          Winter buds larger: brts. dull gray or brown, puberulous when young: pedicels about 1.5 cm. long ..... 8. *L. glauca*

dd. Umbels many-fld.: lvs. more or less pubescent beneath ..... 9. *L. umbellata*

1. **Lindera strychnifolia** Hemsl. 烏藥 (Wu Yao; Black Medicine) (Chun 40). Shrub; fls. IV; fr. VIII; lvs. 3-nerved. China, Formosa; locally in An., Che., Ki., Ku. Brushland.
2. **Lindera rubronervia** Gamble 廬山烏藥 (Lu Shan Wu Yao) (Chun 41). Shrub, to 3 m.; fls. IV; fr. IX. China; locally in An., Ki., Ku. Woodland.
3. **Lindera cercidifolia** Hemsl. 紅葉甘檀 (Hung Yeh Kan Chiang) (R.M. 260). Shrub, to 3 m.; fls. IV; fr. VII. China; locally in An., Ki., Ku. Woodland.
4. **Lindera reflexa** Hemsl. 山檀 (Shan Chiang) (Chun 46). Tree, to 7 m.; fls. IV; fr. red, VIII. China; locally in An., Ki. Woodland.
5. **Lindera megaphylla** Hemsl. 黑殼楠 (Hei K'o Nan; Black-shelled Machilus) (R.M. 259). Evergreen tree, to 10 m.; fr. black, IX. Central and western China; locally in An. Woodland.
6. **Lindera erythrocarpum** Mak. 鉄釘樹 (T'ieh Ting Shu; Iron-nail Tree) (Mak. F. 533). Tree, to 10 m.; fr. red, VIII–IX; lvs. glabrous beneath. Japan, China; locally in An. Woodland.
7. **Lindera angustifolia** Cheng (Sc. C. 8:294). Shrub, to 3 m.; fls. IV; fr. black, VIII–IX; lvs. elliptic to lanceolate. China; locally in An., Ki., Ku. Woodland.
8. **Lindera glauca** Blume 山胡椒 (Shan Hu Chiao) (Mak. F. 533). Tree, to 8 m.; fls. IV; fr. black, VIII–IX; lvs. pubescent beneath. China, Japan; locally in An., Che., Ki., Ku. Woodland. Fig. 123.
9. **Lindera umbellata** Thunb. 釣樟 (Tiao Chang) (R.M. 260). Shrub, to 3 m.; fls. IV; fr. black, VIII. China, Japan; locally in An., Che., Ki., Ku. Woodland.

3. **Litsea** Lam. 木薑子属 (Mu Chiang Tzŭ Shu; Woody-ginger Genus)

Dioecious: fls. in axillary clustered involucrate umbels; *anthers 4-celled*, 4-valved: fr. a drupe. About 150 species, 20 in China. (From the Chinese name of one of the species.)

Key to the Species

a. Lvs. persistent, coriaceous.
  Lvs. glaucous beneath.
    Lvs. oblong or narrowly ovate, 4–8 cm. long ..... 1. *L. chinensis*
    Lvs. oblanceolate, 3-nerved at the base, 7–10 cm. long..... 2. *L. glauca*
  Lvs. pubescent beneath, elliptic-lanceolate, 10–20 cm. long..... 3. *L. elongata*
aa. Lvs. deciduous, membranous.
  Lvs. lanceolate, aromatic, turning dark in drying ..... 4. *L. cubeba*
  Lvs. broadly ovate, 3-nerved at the base, 8–13 cm. long..... 5. *L. fruticosa*

1. **Litsea chinensis** Blume 豺皮樟 (Ts'ai P'i Chang; Wolf-skin (Yellow) (Camphor) (Chun 65). Tree, to 8 m.; fls. VIII–IX; fr. XI. China; locally in An., Che., Ki., Ku. Woodland. Fig. 124.
2. **Litsea glauca** Sieb. 白達木 (Pai Ta Mu) (Mak. F. 535). Shrub; fr. VIII. Japan, Korea, China; locally in An. Forest.
3. **Litsea elongata** (Nees) Hook. f. (H.F. 5:165). Bush; fls. VIII. Southeastern Asia; locally in An. Woodland.
4. **Litsea cubeba** (Lour.) Pers. Aromatic Litsea 山鷄椒 (Shan Chi Chiao; Pheasant Lindera) (Chun 57). Tree, to 10 m.; fls. II; fr. VII. China; locally in An., Che., Ki., Ku. Woodland.

5. **Litsea fruticosa** (Hemsl.) Gamble (Chun 42). Shrub or small tree; fr. IX. China; locally in An., Ki. Brushland.

4. **Cinnamomum** Linn. 樟屬 (Chang Shu)

Evergreen trees with opposite or alternate (ours) *3-nerved lvs.*, very aromatic: fls. small, in panicles; anthers 4-celled: *lobes deciduous from the cup-like perianth in fr.* About 130 species; 14 in China. (From the Arabic name of cinnamon.)

Key to the Species

Axils of the principal veins with glandular pits ..... 1. *C. camphora*
Axils of the principal veins without glandular pits ..... 2. *C. burmanni*

1. **Cinnamomum camphora** Nees & Eberm. Camphor Tree 樟樹 (Chang Shu) (B.M. 423). Evergreen tree, to 20 m.; fls. IV; fr. VIII–IX. China, Japan; locally in An., Che., Ki., Ku. Woodland and planted, ornamental. Fig. 125.
2. **Cinnamomum burmanni** (Nees) Blume 天竺桂 (T'ien Chu Kuei; Indian Osmanthus) (Lee 498). Evergreen shrub or small tree; fls. V. Southeastern Asia; locally in Che. Woodland.

5. **Machilus** Nees 楨楠屬 (Chên Nan Shu)

Evergreen trees with entire *pinnately veined lvs.*: fls. in terminal panicles; anthers 4-celled: lobes of the perianth persistent and spreading in fr. About 20 species, in eastern Asia; 16 in China.

Key to the Species

Lvs. membranous, oblong to lanceolate, sericeous or nearly glabrous beneath, 8-15 cm. long..... 1. *M. ichangensis*
Lvs. coriaceous, ovate to oblong, glaucous beneath, 5-8 cm. long ..... 2. *M. thunbergii*

1. **Machilus ichangensis** Rehd. & Wils. 大葉楠 (Ta Yeh Nan; Large-leaved Machilus) (Chun 24). Tree, to 10 m.; fr. VIII–IX. China; locally in Ki., Ku. Woodland.
2. **Machilus thunbergii** Sieb. & Zucc. 紅楠 (Hung Nan; Red Machilus) (Chun 22). Tree, to 15 m.; fls. IV; fr. black, IX. China, Japan; locally in An., Che., Ki. Woodland.

6. **Phoebe** Nees 雅楠屬 (Ya Nan Shu; Elegant Machilus Genus)

Evergreen: *lvs.* entire, *pinnately veined*: fls. in axillary or subterminal clusters; anthers 4-celled: *lobes of the perianth persistent and erect in fr.* About 30 species, mostly in southeastern Asia; 7 in China. (Greek: *Phoibe*, pure, bright.)

Key to the Species

Mature lvs. glabrous beneath, lanceolate or oblanceolate..... 1. *P. neurantha*
Mature lvs. pubescent beneath, broadly oblanceolate or obovate..... 2. *P. sheareri*

1. **Phoebe neurantha** (Hemsl.) Gamble 白楠 (Pai Nan; White Machilus) (Chun 29). Tree, to 10 m.; fr. blue-black, VIII–IX. China; locally in An., Ki. Woodland.
2. **Phoebe sheareri** (Hemsl.) Gamble 紫楠 (Tzŭ Nan; Purple Machilus) (Chun 32). Tree, to 15 m.; fls. VI; fr. X. China; locally in An., Che., Ki., Ku. Woodland.

70. **PAPAVERACEAE** Poppy Family 罌粟科 (Ying Su K'o)

Herbs, mostly with *milky or colored juice*, and alternate lvs.: *fls.* perfect and

regular; *sepals 2*; petals showy or wanting; stamens numerous; ovary 1-celled, becoming a capsule. About 30 genera with 300 species, especially in north temperate regions; 10 genera and more than 25 species in China.

Key to the Genera

Plants with milky or colored sap: lvs. not finely divided, sometimes pinnately cleft.
Petals present, deciduous ..... 1. *Papaver*
Petals wanting ..... 2. *Macleaya*
Plants with watery sap: lvs. finely divided ..... 3. *Eschscholzia*

1. **Papaver** Linn. Poppy 罂粟属 (Yin Su Shu)

Lvs. lobed or dissected: fls. showy and solitary; *petals* usually 4, deciduous: capsule dehiscent by pores under the disk-like top which is formed by union of the stigmas. 50 species, mostly of the Old World; two or more in China. (The Latin name.)

Key to the Species

Stem lvs. clasping: plant glaucous..... 1. *P. somniferum*
Stem lvs. not clasping: plant usually more or less hairy ..... 2. *P. rhoeas*

1. **Papaver somniferum** Linn. Opium Poppy 罂粟 (Ying Su; Bowl (flower) and Millet (seeds)) (G.M. 681). Erect herb, to 2 m.; fls. pink, white or red, V. Eurasia; locally in An. Cultivated, ornamental and opium.
2. **Papaver rhoeas** Linn. Corn Poppy 麗春花 (Li Ch'un Hua; Beautiful-spring Flower) (G.M. 681). Erect herb, to 1 m.; fls. pink, V–VI. Eurasia; locally in Ku. Cultivated, ornamental. Fig. 126.

2. **Macleaya** R. Br. 博落廻属 (Po Lo Hui Shu)

Erect, sometimes almost shrubby, herbs: *lvs. pinnately lobed*, glaucous beneath: fls. numerous, in terminal panicles; sepals cream-colored; *petals wanting*: capsules flattened. Two species, in eastern Asia. (After Alex. Macleay, Colonial Secretary of New South Wales.)

1. **Macleaya cordata** (Willd.) R. Br. Plume Poppy 博落廻 (Po Lo Hui; Bending-spreading Plant) (G.M. 680). Erect herb, to 3 m.; fls. white, VI; fr. brownish, VII–VIII. China, Japan; locally in An., Ki., Ku., Che., Hon., Hup. Grassland. Fig. 127.

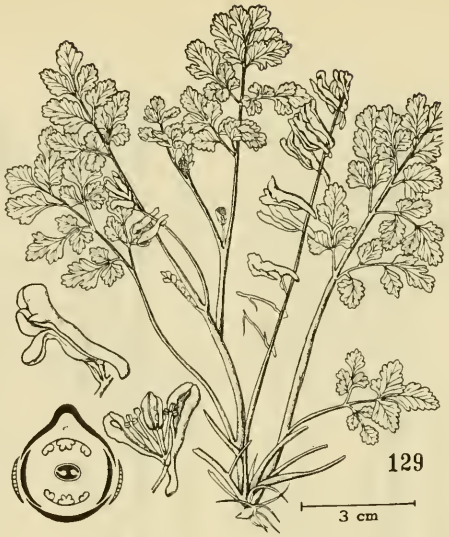
3. **Eschscholzia** Cham. 金英花属 (Chin Ying Hua Shu)

Spreading herbs with *watery sap* and *finely divided lvs.*: fls. showy and solitary; sepals joined into a pointed hood which is crowded off as the fl. expands; petals 4: capsule long and slender, dehiscent by two longitudinal valves. About 12 species, in western North America; one cultivated in China. (After J.F. Eschscholtz, 1793–1831, member of Kotzebue's scientific expedition.)

1. **Eschscholzia californica** Cham. California Poppy 金英花 (Chin Ying Hua; Golden-eminent Flower) (B.M. 426). Bushy herb, to 1 m.; fls, yellow. IV. Western United States; locally in Ku. Cultivated, ornamental. Fig. 128.

71. **FUMARIACEAE** Fumitory Family 荷包牡丹科 (Ho Pao Mu Tan K'o)

Delicate *smooth herbs*, closely allied to *Papaveraceae* with which it is often



127. Macleaya cordata
128. Eschscholzia californica
129. Corydalis incisa
130. Thlaspi arvense
131. Capsella bursa-pastoris
132. Rorippa montana

united, and from which it differs in having *watery sap* and *irregular fls.*; *sepals 2*, small and scale-like; petals 4, one or both of the outer pair spurred or saccate at the base; carpels 2, united, becoming a 2-valved several-seeded capsule. 5 genera with 170 species, mostly in north temperate regions; 3 genera and over 25 species in China.

Key to the Genera

One of the two outer petals spurred at the base ..... 1. *Corydalis*
Both outer petals spurred at the base ..... 2. *Dicentra*

1. **Corydalis** Medic. 紫堇属 (Tzŭ Chin Shu)

Erect or spreading herbs: lower lvs. decompound: fls. in racemes; *one of the outer petals spurred at the base*: capsule many-seeded. Over 100 species, north temperate regions and south Africa; 20 in China. (The Greek name for the crested lark.)

Key to the Species

a. Plants with underground tubers: fls. purple.
Bracts of the infl. all entire: plant glabrous ..... 1. *C. cava*
Bracts of the infl. all, or at least the lower, 3-lobed at the apex.
Floral bracts all lobed or incised: stem bearing a conspicuous bract below the lvs ..... 2. *C. solida*
Floral bracts about equal to the pedicel; the lower incised; the upper entire: plant puberulent ..... 3. *C. sheareri*
aa. Plants with fibrous roots, not tuberous: fls. pink, purple or yellow.
b. Fls. pink or purple: capsules not torulose.
Bracts of the infl. deeply incised; fls. pink ..... 4. *C. incisa*
Bracts of the infl. entire, ovate, acuminate: fls. purple ..... 5. *C. edulis*
bb. Fls. yellow: capsules often torulose.
c. Pods twisted; seeds with alternating rows of oblong depressions and ridges: flg. bracts lanceolate; sepals broad-ovate, with ragged margins; corolla curved, 11 mm. long, the spur 1/2 the length of the tube: lvs. glaucous beneath, segments ovate ..... 6. *C. ophiocarpa*
cc. Pods not twisted, torulose or smooth, curved or nearly straight: flg. bracts linear; corolla nearly straight, with spur 1/3 the length of the tube.
Pods nearly straight, 2-5 cm. long; seeds muriculate, with dense rows of short processes in concentric arrangement around the circumference: sepals ovate with ragged margins; corolla 12-15 mm. long, lvs. slightly glaucous beneath, segments lanceolate-oblong ..... 7. *C. pallida*
Pods torulose, 3-4 cm. long: seeds echinulate, with dense rows of slender processes in concentric arrangement around the circumference: sepals narrow-ovate, acute, with undulate margins: corolla 18-20 mm. long; lvs. glaucous, segments ovate ..... 8. *C. racemosa*

1. **Corydalis cava** (L.) Schweig. & Körte (*C. bulbosa* Pers.) (B.M. 430). Fleshy herb, 15–30 cm. high; fls. purple, IV; fr. V. Eurasia; locally in Ku. Moist shade.
2. **Corydalis solida** (L.) Sw. (*C. bulbosa* DC., non Pers.) 球紫堇 (Ch'iu Tzŭ Chin) (B.M. 430). Herb, 1–2 dm. high; fls. blue, pink or purple, III–IV. Eurasia; locally in Ku. Moist shade.

3. **Corydalis sheareri** S. Moore (J.B. 1875:225). Fleshy herb, 1–3 dm. high; fls. purple, IV; fr. V. China; locally in Ki. Under hardwood forest.
4. **Corydalis incisa** (Thunb.) Pers. 紫堇 (Tzŭ Chin) (Per. S. 2:269). Bushy herb, 1–5 dm. high; fls. pink, III–IV; fr. V. Japan, China; locally in An., Che., Ku. Moist places. Fig. 129.
5. **Corydalis edulis** Maxim, (St. P.B. 3rd ser. 24:30). Fleshy herb, to 4 dm.; fls. purple, IV–V; fr. V–VII. Northern and central Asia; locally in Ki., Ku. Moist woodland.
6. **Corydalis ophiocarpa** Hook. f. & Thoms. (B.M. 430). Fleshy herb, 3–5 dm. high; fls. yellow, IV–V; fr. V–VI. Himalayas to central China; locally in An. Moist valley woods.
7. **Corydalis pallida** (Thunb.) Pers. 黃堇 (Huang Chin) (B.H. 207). Bushy herb, 1–5 dm. high; fls. yellow, IV; fr. V; pods linear. Asia, North America; locally in An., Che., Ku. Moist places.
8. **Corydalis racemosa** (Thunb.) Pers. 斷腸草 (Tuan Ch'ang Ts'ao; Lacerated-intestine Herb) (Per. S. 2:270). Bushy herb, 1–4 dm. high; fls. yellow, III–IV; fr. V–VI. Japan, China; locally in An., Ku. Moist places.

It is evident from the disagreement in published descriptions and the confusion in the labels on herbarium material that no really statisfactory key to the species of *Corydalis* in our area can be produced without access to a more complete series of specimens bearing both flowers and fruit. The magnitude of the problem is indicated by the fact that Komarov in his Flora URSS, Vol. VII (1937) has keyed and listed or described over 60 species of this genus.

2. **Dicentra** Bernh. 荷包牡丹属 (Ho Pao Mu Tan Shu)

Perennial herbs: lvs. ternately decompound or dissected: fls. in racemes; *both outer petals spurred at the base*: pod 10–20-seeded; seeds crested. About 15 species, in Asia and North America; one cultivated in China. (Greek term for "two-spurred.")

1. **Dicentra spectabilis** (L.) Lem. Bleeding Heart 荷包牡丹 (Ho Pao Mu Tan; Pouch Peony) (B.M. 429). Perennial herb, 3–6 dm. high; fls. pink, IV, double-spurred. Introduced from Japan; locally in Ku. Cultivated, ornamental.

72. **CAPPARIDACEAE** Caper Family 白花菜科 (Pai Hua Ts'ai K'o)

Plants with watery sap and simple or palmately compound alternate lvs.: fls usually perfect, more or less irregular; *sepals 4*; *stamens 6* or more, nearly *equal*; *ovary 1-celled*, becoming a capsule, berry or drupe, often (as in ours) on a long stipe. 35 genera with 450 species, mostly tropical and subtropical; 4 genera and about 10 species in China.

1. **Gynandropsis** DC. 白花菜属 (Pai Hua Ts'ai Shu)

Bushy annuals with 5-foliolate lvs.: fls. in racemes; sepals and petals 4; stamens joined to the gynophore: capsule slender, stalked. Two species, abundant in tropical countries; one in China. (Greek: *gune*, a female; and *andropsis*, appearance of a man.)

1. **Gynandropsis gynandra** (L.) Merr. (*G. pentaphylla* DC.) 白花菜 (Pai Hua Ts'ai; White-flower Herb) (M.F. 216; M.E. 2:209). Bushy herb, to 1 m.; fls. white, VIII–IX. Lfts. ovate. All warm countries; locally in Ku. Roadside thickets. Fig. 137.

Gynandropsis speciosa (HBK) DC. (Prodr. 1: 238), with oblong leaflets and larger flowers (petals 2.-2.5 cm. long) has been naturalized in Kiangsu.

73. CRUCIFERAE Mustard Family 十字花科 (Shih Tzŭ Hua K'o)

Herbs with *watery* acrid *sap* and *alternate* lvs.: fls. comparatively small and numerous, in racemes or corymbs; sepals and petals 4; *stamens 6, tetradynamous*; pistil of 2 united carpels, becoming a capsule (silique or silicle), usually dehiscent by two valves. About 200 genera with 1,800 species, widely distributed, especially in temperate and cold regions; 25 genera and over 60 species in China.

Key to the Genera

A. Fr. a short pod (a silicle).
  B. Fr. strongly compressed.
    C. Fr. flattened parallel to the partition, oblong: pubescence stellate ..... 1. *Draba*
    CC. Fr. flattened at right angles to the partition.
      D. Pods orbicular, ovate, obovate or obcordate.
        Pods more or less winged.
          Seeds several in each cell; pods broadly winged. 2. *Thlaspi*
          Seeds one in each cell; pods narrowly winged.. 3. *Iberis*
        Pods not winged; seeds one in each cell ..... 4. *Lepidium*
      DD. Pods wedge-shaped, triangular ..... 5. *Capsella*
  BB. Fr. somewhat compressed; carpels thickish, wrinkled, separating at maturity as two nutlets ..... 6. *Coronopus*
  BBB. Fr. globular, not at all compressed ..... 7. *Rorippa* (in part)
AA. Fr. more than 3× as long as broad (a silique).
  E. Petals yellow or orange yellow.
    F. Lvs. pinnately cleft or divided.
      Pod with beak.
        Pod with a beak 2–8 mm. long; seeds in one row in each cell: fls. 1 cm. or more across ..... 8. *Brassica*
        Pod with a beak not over 1.5 mm. long; seeds in two rows in each cell: fls. much smaller ..... 7. *Rorippa* (in part)
      Pod without beak: stigma sessile ..... 9. *Descurainia*
    FF. Lvs. entire
      Fls. usually 2 cm. or more when open, orange yellow and brown ..... 10. *Cheiranthus*
      Fls. usually smaller, light yellow ..... 11. *Erysimum*
  EE. Petals white or purple.
    Fr. dehiscent by two valves.
      Fls. purple, large ..... 12. *Orychophragmus*
      Fls. white, medium sized or small ..... 13. *Cardamine*
    Fr. indehiscent ..... 14. *Raphanus*

1. **Draba** Linn. 葶藶屬 (T'ing Li Shu)

Low herbs, generally *stellate-pubescent*: lvs. simple, mostly in basal rosettes: fls. small, white or yellow: *fr.* strongly *flattened parallel to the* broad *partition*. 175 species, mostly in the northern hemisphere; two or more in China. (Old Greek name for a cress.)

1. **Draba nemorosa** Linn. 葶藶 (T'ing Li) (G.M. 698). Erect herb, 5–30 cm. high; fls. yellow, III–IV; pods flattened, elliptic-oblong. Eurasia, North America; locally in Che., Ku. Open hills.

2. **Thlaspi** Linn. Penny Cress 菥蓂屬 (Hsi Ming Shu)

Erect *glabrous* herbs: basal lvs. forming a rosette; upper stem lvs. auriculate

or clasping: fls. small, white or purplish: *fr. orbicular to obcordate, strongly flattened at right angles to the partition, broadly winged, with several seeds in each cell.* About 25 species, in the Old World; one in China. (Greek: *thlaein*, to crush or flatten.)

1. **Thlaspi arvense** Linn. Field Penny Cress 菥蓂 (Hsi Ming) (G.M. 701). Erect herb, 1–5 dm. high; fls. white, III; fr. IV–V; pods flattened, orbicular. Eurasia; locally in An., Che., Ku. Moist places. Fig. 130.

3. **Iberis** Linn. Candytuft 曲花属 (Ch'ü Hua Shu)

Herbs or shrubs with entire or pinnatifid lvs.: petals sometimes wanting: *fr. orbicular or ovate, strongly flattened at right angles to the partition, narrowly winged,* with *one seed in each cell.* 35 species, in the Mediterranean region; one cultivated in China. (From *Iberia*, the ancient name of Spain.)

1. **Iberis amara** Linn. Rocket Candytuft 曲花 (Ch'ü Hua; Bent Flower) (B.M. 441). Annual; fls. white; pods flattened, orbicular. Introduced from Europe; locally in Ku. Cultivated, ornamental.

4. **Lepidium** Linn. Peppergrass 独行菜属 (Tu Hsing Ts'ai Shu)

Brg. herbs with numerous small white or greenish fls. in terminal racemes: *pubescence,* when present, *of simple hairs*: perianth deciduous; stamens sometimes only 2 or 4: petals often lacking: *fr. orbicular* to ovate, *strongly flattened* at right angles to the partition; the *margin not winged* or slightly winged: seeds one in each cell. About 100 species, widely distributed: 5 in China. (Greek: diminutive of *lepis*, a scale, referring to the flat scale-like pods.)

Key to the Species

Petals present: seeds with narrow margin	1. *L. virginicum*
Petals none: seeds without margin	2. *L. ruderale*

1. **Lepidium virginicum** Linn. Poor-man's Pepper 独行菜 (Tu Hsing Ts'ai) (G.M. 701). Bushy herb, 1–5 dm. high; fls. greenish white, V–VI; fr. VI–VII; pods flattened, orbicular. Introduced from North America, West Indies; locally in Ku. Occasional weed.
2. **Lepidium ruderale** Linn. (G.M. 702). Annual or biennial, to 5 dm.; fl. III–V; fr. X. Introduced from Europe; locally in Ku. Occasional weed.

5. **Capsella** Medic. Shepherd's Purse 荠属 (Chi Shu)

Erect annuals with numerous small white fls. in terminal racemes: *fr.* obcordate to *triangular* (ours), *compressed* at right angles to the narrow partition, not winged; *seeds numerous.* 4 species, in the northern hemisphere; one in China. (Latin: diminutive of *capsa*, a box.)

1. **Capsella bursa-pastoris** (L.) Medic. 荠 (Chi) (G.M. 704). Erect herb, 1–5 dm. high; fls. white, III–IV; fr. IV–V; pods flattened, triangular. Europe; locally in An., Che., Ki., Ku. Common weed; leaf rosettes gathered for food in the early spring. Fig. 131.

6. **Coronopus** Ludwig Wart Cress 鸦脚菜属 (Ya Chüeh Ts'ai Shu; Crow-foot Herb Genus)

Diffuse rank-smelling herbs with pinnatifid lvs. and small greenish fls.: stamens

often only 2 or 4: *fr.* somewhat compressed, thickish, *wrinkled, separating* at maturity *into two 1-seeded nutlets.* 6 species, tropical and temperate regions; one in China. (Greek: *korax*, a raven or crow; and *pous*, feet, because of the deeply cleft lvs.)

1. **Coronopus didymus** (L.) Sm. (G.M. 703). Spreading herb; fls. and frs. green, III–VII; fr. separating into 2 wrinkled nutlets. Old World; locally in Ku. Roadside weed.

7. **Rorippa** Scop. Yellow Cress 繞水爬属 (Jao Shui P'a Shu; Creeping-around-the-water Genus)

Erect herbs with pinnate or pinnatifid lvs.: fls. usually yellow, rarely white, with small nectariferous glands: fr. in the form of a short silique, or globular: seeds numerous, turgid, marginless. (From *Roripper*, the Saxon name for these plants.)

Key to the Species

Pods globose or slightly oblong, fls. yellow ..... 1. *R. globosa*
Pods oblong or linear.
Pods oblong, 5-6 mm. long: fls. white or greenish yellow..... 2. *R. microsperma*
Pods linear, curved or ascending, 10-25 mm. long: fls. pale yellow . 3. *R. montana*

1. **Rorippa globosa** (Turcz.) Thell. (*Nasturtium cantoniense* Hance) 銀條菜 (Yin T'iao Ts'ai; Silver-shoot Vegetable) (BBAS 2:190). Erect herb, 0.5–1 m. high; fls. yellow, V; fr. VI. Siberia, China; locally in Ku. Moist fields,
2. **Rorippa microsperma** (DC.) L.H. Bailey (*Nasturtium microspermum* DC.) 細子葶菜 (Hsi Tzŭ Han Ts'ai) (DC. P. 1:139; BBAS 2:191). Brg. herb, 5–15 cm. high; fls. white or greenish yellow, IV; fr. V. China; locally in Ku. Weed.
3. **Rorippa montana** (Wall. ex Benth.) Small (*Nasturtium montanum* Wall. ex Benth.) 葶菜 (Han Ts'ai) (Sm. F. 2nd. 1336; BBAS 2:192). Spreading herb, 1–5 dm. high; fls. greenish yellow, V; fr. VI–VII; pods short, curved. Eastern Asia; locally in Ki., Ku. Moist places. Fig. 132.

8. **Brassica** Linn. 蕓薹属 (Yün T'ai Shu)

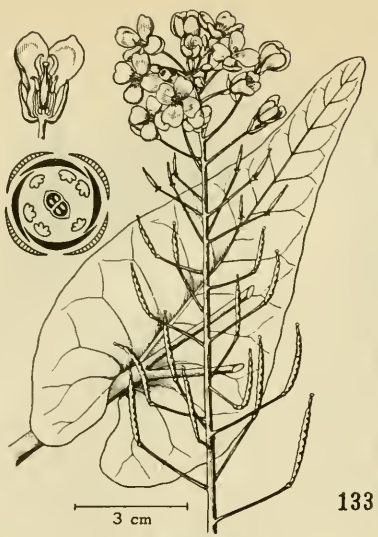
Erect herbs with pinnately cleft or divided lvs.: *fls. yellow*; petals with long claws: *fr.* an elongated silique *with a* conical *beak.* About 100 species, in Eurasia and North Africa; 20 or more in China: includes a number of valued vegetables such as cabbage, cauliflower, kohlrabi and turnip, as well as mustard, rape and radish. (Latin name of the cabbage.)

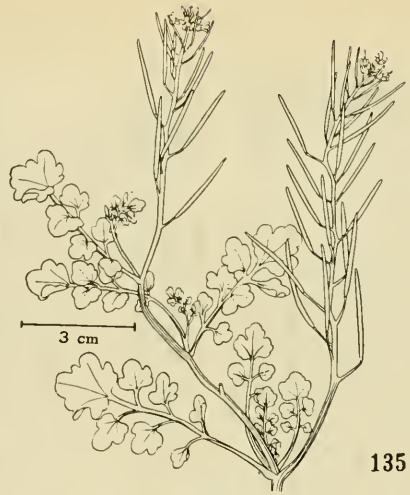
Key to the Species

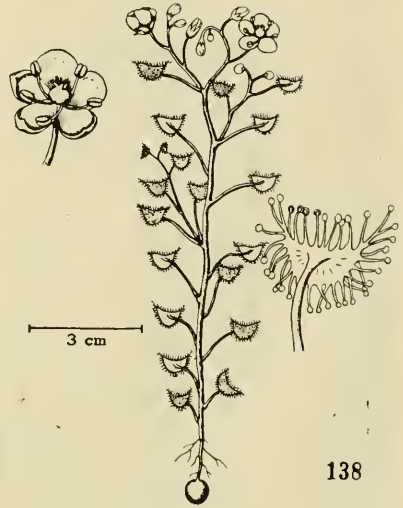
Upper lvs. clasping the stem ..... 1. *B. rapa*
Upper lvs. scarcely or not at all clasping the stem..... 2. *B. juncea*

1. **Brassica rapa** Linn. (*B. campestris* Linn.) Field Mustard 蕓薹 (Yün T'ai) (G.M. 708). Erect herb, to 1 m.; fls. yellow, IV; fr. V. Introduced from Europe; locally in An., Che., Ki., Ku. Roadside and field weed. Fig, 133.
2. **Brassica juncea** (L.) Coss. Indian Mustard 芥 (Chieh) (G.M. 707). Erect slender herb, to 1 m.; fls. bright yellow, IV; fr. V. Asia; locally in An., Che., Ki., Ku. Cultivated and escaped.

The following *Brassica* cultigens are among the many grown in the Lower Yangtze Valley, but are not naturalized in this area:







133. Brassica rapa
134. Cheiranthus cheiri
135. Cardamine flexuosa
136. Raphanus sativus
137. Gynandropsis gynandra
138. Drosera peltata

a. **Brassica caulorapa** Pasq. Kohlrabi (B.M. 436). Stout herb, 4–8 dm. high; fls. light yellow, IV; fr. V; stem enlarged into a tuber above ground. Introduced from Europe; locally in An., Che., Ki., Ku. Cultivated for the edible tubers.

b. **Brassica chinensis** Linn. Pak-choi 白菜 (Pai Ts'ai) (B.M. 438). Erect herb, to 1 m.; fls. pale yellow, IV; fr. V. stem lvs. narrow. Eastern Asia; locally in An., Che., Ki., Ku. Cultivated, leaf vegetable.

c. **Brassica narinosa** Bailey Broad-beaked Mustard 瓢兜菜 (P'iao Êrh Ts'ai) (B.M. 437). Stout herb, to 1 m.; fls. yellow, IV; fr. V; stem lvs. almost orbicular. Asia; locally in An., Che., Ki., Ku. Cultivated, leaf vegetable.

d. **Brassica nipposinica** Bailey var. **laciniifolia** Bailey (B.G. 1:86, f. 36, 37). Erect herb, to 1 m.; fls. pale yellow, IV; fr. V; lvs. laciniately cleft. Japan and China; locally in An., Che., Ki., Ku. Cultivated, leaf vegetable.

e. **Brassica oleracea** Linn. var. **botrytis** Linn. Cauliflower (B.M. 436). Stout herb, 4–8 dm. high; fls. cream-colored, IV, in dense terminal clusters; fr. V. Introduced from Europe; locally in An., Che., Ki., Ku. Cultivated for edible flg. head.

f. **Brassica oleracea** Linn. var. **capitata** Linn. Cabbage 甘藍 (Kan Lan) (B.M. 435). Stout herb, to 1 m.; fls. cream-colored, V; fr. VI; lvs. forming a hard head. Introduced from Europe; locally in An., Che., Ki., Ku. Cultivated, leaf vegetable.

g. **Brassica oleracea** Linn. var. **gemmifera** Zenker Brussels Sprouts (B.M. 435). Stout herb, 7–10 dm. high; fls. cream-colored, V; fr. VI; bearing small lfy. heads in the main lf. axils. Introduced from Europe; locally in An., Che., Ki., Ku. Cultivated for the edible lfy. heads.

h. **Brassica parachinensis** Bailey Mock Pak-choi (B.M. 438). Erect herb, to 1 m.; fls. light yellow, IV; fr. V; lvs. petiolate, not clasping. China; locally in An., Che., Ki., Ku. Cultivated, leaf vegetable.

i. **Brassica pekinensis** Rupr. (*B. pe-tsai* Bailey) Shantung Cabbage (B.M. 437). Erect herb, to 1 m.; fls. light yellow, IV; fr. V; lvs. in compact conical head. China; locally in An., Che., Ki., Ku. Cultivated for the edible lfy. heads.

j. **Brassica purpuraria** (Bailey) Bailey (*B. campestris* Linn. var. *purpuraria* Bailey) Purple-stemmed Mustard 紫菜苔 (Tze Ts'ai Tai) (B.G. 4:330). Stout herb, 7–10 dm. high; fls. yellow, IV; fr. V; stems dark purple. China; locally in An., Che., Ki., Ku. Cultivated, young flg. stems used as a vegetable.

9. **Descurainia** Webb & Berth. 播娘蒿属 (Pu Niang Hao Shu)

Brg. herbs (ours) or shrubs with finely dissected lvs. and *small yellow fls.*: *fr.* an elongated silique, *without beak.* About 20 species, mostly in north temperate regions; one in China. (Named for François Déscourain, 1658–1740, French apothecary and botanist.)

1. **Descurainia sophia** (L.) Webb 播娘蒿 (Pu Niang Hao) (G.M. 711). Erect herb, 0.5–1 m. high; fls. yellow, IV–V; fr. V–VI. Eurasia; locally in Ku. Roadside weed.

10. **Cheiranthus** Linn. Wallflower 桂竹香属 (Kuei Chu Hsiang Shu)

Perennial herbs with *entire lvs.*, covered with appressed forked hairs: *fls. orange-yellow* and brown: *silique 4-angled.* About 15 species, in southern Eurasia; two in China. (From *Cheiri*, the Arabic name of a plant; and *anthos*, flower.)

1. **Cheiranthus cheiri** Linn. Wallflower 桂竹香 (Kuei Chu Hsiang; Fragrant-cinnamon Bamboo) (B.M. 439). Erect herb, 2–4 dm. high; fls. yellow to reddish

purple, IV. Introduced from southern Europe; locally in Ku. Cultivated, ornamental. Fig. 134.

11. **Erysimum** Linn. Treacle Mustard 大橙黃草屬 (Ta Ch'êng Huang Ts'ao Shu; Big-orange Herb Genus)

Similar to *Cheiranthus*, but differing in having *light yellow fls.* and more *angular frs.* About 100 species, in Eurasia and North America; 4 in China. (Greek: *eruein*, to draw blisters.)

1. **Erysimum cheiranthoides** Linn. Wormseed Mustard (G.M. 713). Erect herb, 2–5 dm. high; fls. light yellow, V. Introduced from northern Europe and North America; locally in An., Ku. Cultivated, ornamental.

12. **Orychophragmus** Bunge 諸葛菜屬 (Chu Ko Ts'ai Shu)

Erect brg. glabrous glaucous herb: basal lvs. lyrate-pinnatifid: *fls.* large, *violet*: *fr. a* slender *4-angled silique*. One species, in China.

1. **Orychophragmus violaceous** (L.) Schulz (*Moricandia sonchifolia* (Bge.) Ledeb.) 諸葛菜 (Chu Ko Ts'ai) (Bo. Ma. 6243; K.B. 1930:269). Erect herb, 3–8 dm. high; fls. violet purple, III–IV; fr. IV–V. North China; locally in Ku. Woodland shade.

13. **Cardamine** Linn. Bitter Cress 碎米薺屬 (Sui Mi Chi Shu)

Glabrous herbs with *white* (ours) or purple *fls.*: *fr. a* slender *flattened silique*. About 125 species, in temperate regions; 12 in China. (A Greek name, *kardamon*, used by Discorides for some cress.)

Key to the Species

a. Lf. petioles not auricled at the base.
  Fls. 2–4 mm. long frtg. pedicels 5–10 mm. long.
    Siliques spreading-ascending, not exceeding the upper fls.: stem lvs. similar to the basal ones ..... 1. *C. flexuosa*
    Siliques stiffly erect, exceeding the fls.: stem lvs. unlike the basal ones ..... 2. *C. hirsuta*
  Fls. 5–8 mm. long: frtg. pedicels 12–14 mm. long ..... 3. *C. lyrata*
aa. Lf. petioles auricled at the base: fls. about 3 mm. long: frtg. pedicels 6–10 mm. long ..... 4. *C. impatiens*

1. **Cardamine flexuosa** With. 碎米薺 (Sui Mi Chi; Herb-of-Fragments) (G.M. 722). Slender herb, 2–4 dm. high; fls. white, small, 2 mm. across, IV; fr. V. Eurasia, North America; locally in An., Che., Ku. Damp places. Fig. 135.
2. **Cardamine hirsuta** Linn. (G.M. 722). Erect annual, 5–30 cm. high; fls. white, IV; fr. V, stiffly erect. Eurasia; locally in Ku. Open banks.
3. **Cardamine lyrata** Bunge (BBAS 2:187). Glabrous herb, 3–5 dm. high; fls. white, large, 5–8 mm. long, IV; fr. V. Northern Asia; locally in An., Che., Ki., Ku. Moist ditch banks.
4. **Cardamine impatiens** Linn. (G.M. 722). Erect herb, 1–8 dm. high; fls. white or green, IV; fr. V. Eurasia; locally in Che., Ku. Damp ground.

Cardamine limprichtiana Pax (BBAS 2:187) with terminal leaflet conspicuous, broadly ovate, subcordate at base, acuminate at apex, and with margin unequally crenate, occurs in Chekiang.

14. **Raphanus** Linn. Radish 萊菔属 (Lai Fu Shu)

Coarse erect herbs with *fleshy tap roots*: lvs. pinnately lobed: *fls. large, white or lavendar purple*: *fr.* an *indehiscent* silique, constricted between the seeds. 6 species, in Eurasia; one in China. (The Greek name.)

1. **Raphanus sativus** Linn. Radish 蘿蔔 (Lo P'o) (G.M. 439). Stout herb, to 1 m.; fls. white, tinged with purple, V–VI; fr. VI, indehiscent. Asia; locally in An., Che., Hup., Hon., Ki., Ku. Cultivated, root vegetable. Fig. 136.

74. **DROSERACEAE** Sundew Family 茅膏菜科 (Mao Kao Ts'ai K'o)

Glandular-hairy herbs growing in wet or boggy places: *lvs.* mostly basal, circinate in the bud, variously modified and *adapted to catching insects*: fls. perfect, regular: fr. a capsule with numerous seeds. 4 genera with 90 species; one genus and 4 species in China.

1. **Drosera** Linn. Sundew 茅膏菜属 (Mao Kao Ts'ai Shu)

Bog herbs with tufted basal lvs. and *glandular* bristles, secreting a sticky liquid which *entraps insects*: fls. in 1-sided racemes on scapose stems; petals and stamens usually 5. About 85 species, especially abundant in Australia; 4 in China. (Greek: *droseros*, dewy, referring to the dew-like drops of exudation on the lvs.)

1. **Drosera peltata** Sm. 盾葉茅膏菜 (Tun Yeh Mao Kao Ts'ai) (H.F. 2:424). Slender herb, 1–3 dm. high; fls. white, IV; lvs. peltate, glandular. Asia, Australia; locally in Che., Ki., Ku. Marshy ground. Fig. 138.

75. **CRASSULACEAE** Orpine Family 景天科 (Ching T'ien K'o)

Mostly *succulent herbs* (ours) or shrubs: *fls.* perfect and *regular*; *carpels as many as the calyx lobes*, becoming follicles. About 20 genera with 900 species, widely distributed; 6 genera and 40 species in China.

Key to the Genera

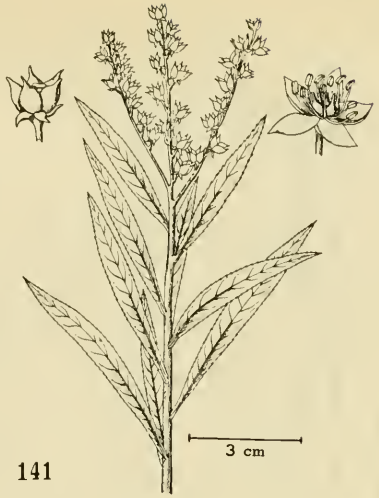
A. Plants succulent: carpels distinct.
  Corolla of united segments, not cleft below the middle; calyx and corolla 5-lobed or -parted ..... 1. *Cotyledon*
  Corolla of separate petals, or the segments only slightly united at the base ..... 2. *Sedum*
AA. Plants not succulent: carpels united, forming a 5-celled capsule ..... 3. *Penthorum*

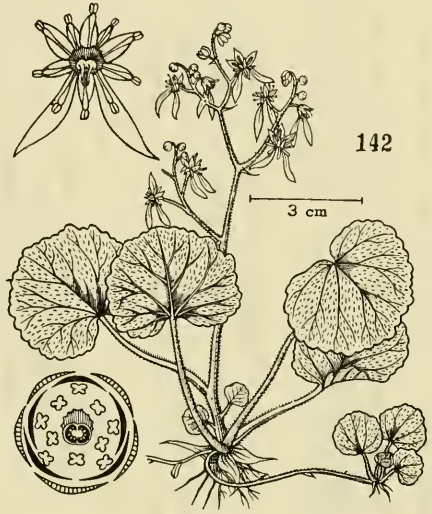
1. **Cotyledon** Linn. 石蓮花属 (Shih Lien Hua Shu)

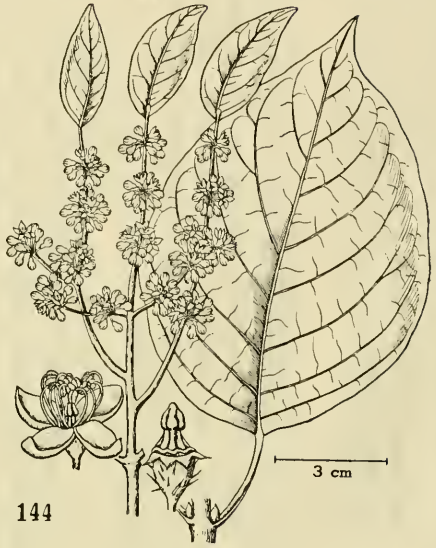
Lvs. simple, mostly in rosettes: fls. in terminal racemes or cymes; *calyx and corolla 5-cleft or -parted*; *corolla gamopetalous*; stamens 10. 50 or more species, mostly of South Africa; 4 in China. (Greek meaning "a cup-shaped hollow.")

1. **Cotyledon fimbriata** Turcz. (*Sedum fimbriatum* (Turcz.) Franch.) 鬚石蓮花 (Hsü Shih Lien Hua; Bearded-rock Lotus Flower) (B.H. 2nd. 672). Succulent herb, 2–4 dm. high; fls. white, IX–X. China; locally in Ku. Rocky outcrops and tile roofs. Fig. 139.

The name *Cotyledon fimbriata* Turcz. was not, strictly speaking, published by Turczaninow as a valid binomial. It was listed as a nomen nudum in his "Catalogus Plantarum in Regionibus Baicalenbus et in Dahuria sponte crescentium" (1838). In Turczaninow's "Flora Baica-







139. Cotyledon fimbriata
140. Sedum aizoon

141. Penthorum sedoides
142. Saxifraga sarmentosa

143. Hydrangea umbellata
144. Schizophragma integrifolium

lense-Dahurica" (Bull. Soc. Nat. Moscow 17:241.1844) the name appears as a synonym under *Umbilicus fimbriatus* for which a good description is given. This description is accepted as validating the combination *Cotyledon fimbriata* Turcz.

2. **Sedum** Linn. Stonecrop 景天属 (Ching T'ien Shu)

Low, mostly glabrous, fleshy herbs: lvs. generally alternate: fls. in terminal, often 1-sided cymes; *corolla of separate petals*. About 200 species, of temperate and northern cold regions; 30 in China. (Latin: *sedens*, sitting, from the low habit of many species of the genus.)

Key to the Species

a. Plants with moss-like habit, 4–6 cm. high ..... 1. *S. polytrichoides*
aa. Plants not moss-like, usually more than 6 cm. high.
b. Fls. white or greenish white, not yellow.
Plant weak and decumbent: lvs. entire, pubescent ..... 2. *S. drymarioides*
Plant stout and erect: lvs. toothed, glabrous and glaucous.. 3. *S. alboroseum*
bb. Fls. yellow.
c. Lvs. incised ..... 4. *S. aizoön*
cc. Lvs. entire.
d. Lvs. spatulate.
Lvs. narrowly spatulate, veined, rounded or obtuse at the tip ..... 5. *S. subtile*
Lvs. broadly spatulate, not veiny, rounded at the tip. 6. *S. baileyi*
dd. Lvs. lanceolate or linear.
All the lvs. linear, 1–5 cm. long, obtuse, alternate.. 7. *S. lineare*
Lvs. or some of them lanceolate, acute and whorled.
Fls. small, 6–8 mm. across ..... 8. *S. alfredii*
Fls. large, 10–12 mm. across ..... 9. *S. quaternatum*

1. **Sedum polytrichoides** Hemsl. (F.H.E. 23:286). Ascending herb, to 10 cm.; fls. yellow, VI. Northeastern Asia; locally in An., Ku. Rocky places.
2. **Sedum drymarioides** Hance 火燄草 (Huo Yen Ts'ao; Fire-tongue Herb) (Fr. S. 2:40). Decumbent herb; fls. white, VII; lvs. broad, spatulate, pubescent. Southeastern China, Formosa; locally in Che., Hon., Ki., Ku. Shaded banks in the mountains.
3. **Sedum alboroseum** Baker 景天 (Ching T'ien; Beautiful Day) (B.M. 460). Erect succulent, to 8 dm.; fls. greenish white, X. Japan, China; locally in Ku. Cultivated, ornamental.
4. **Sedum aizoön** Linn. 細葉費菜 (Hsi Yeh Fei Ts'ai) (G.M. 734). Erect succulent herb, 1–4 dm. high; fls. yellow, VII. Northern Asia; locally in An., Hon., Hup., Ki., Ku. Rocky outcrops. Fig. 140.
5. **Sedum subtile** Maxim. 細景天 (Hsi Ching T'ien; Delicate Sedum) (Mak. F. 502). Weak succulent; fls. yellow, VI. Eastern Asia; locally in An., Ki., Ku. On rocks.
6. **Sedum baileyi** Praeger (B.G. 1:26). Weak succulent. China; locally in Che., Ki.
7. **Sedum lineare** Thunb. 佛甲草 (Fu Chia Ts'ao; Buddha's Scaly Herb) (Fr. S. 2:87). Erect succulent herb, 5–15 cm. high; fls. yellow, VIII. Japan, southeastern China; locally in Che., Ki., Ku. Shaded rocks.
8. **Sedum alfredii** Hance 馬尿莧 (Ma Shih Hsien; Horse-manure Amaranthus) (Fr.

S. 2:94). Succulent herb, 1–2 dm. high; fls. yellow, VI, small, 6–8 mm. across. China, Japan; locally in Ku. Rocky outcrops.

9. **Sedum quaternatum** Praeger (B.G. 1:26). Decumbent succulent herb; fls. yellow, large, 10–12 mm. across, VI. China; locally in Ki., Ku. Stone walls.

3. **Penthorum** Linn. Ditch Stonecrop 扯根菜属 (Ch'ê Kên Ts'ai Shu)

Plants erect, *not succulent*: *lvs. alternate*: fls. greenish, in terminal 1–sided cymes: calyx lobes 5; *petals usually none*; stamens 10; *fr. a 5–horned* 5–celled *capsule*. 3 species, in eastern Asia and eastern North America; one in China. (Greek: *pente*) five; and *horos*, mark, referring to the 5–parted fl.)

1. **Penthorum sedoides** Linn. 扯根菜 (Ch'ê Kên Ts'ai; Tough-rooted Vegetable, (G.M. 736). Erect herb, 5–10 dm. high; fr. X, a 5–horned capsule. Eastern Asia, eastern North America; locally in An., Ku. Ditch banks. Fig. 141.

76. **SAXIFRAGACEAE** Saxifrage Family 虎耳草科 (Hu Êrh Ts'ao K'o)

Herbs or shrubs: calyx 4–5–parted; petals sometimes wanting; stamens as many or twice as many as the calyx lobes; *carpels fewer than the calyx lobes*, often 2: *fr. a capsule or follicle*. 70–100 genera with 900–1,000 species, mostly of temperate and tropical regions; 14 genera and 70 species in China.

Key to the Genera

A. Herbs.
  B. Lvs. compound, 2–3-ternate ..... 1. *Astilbe*
  BB. Lvs. simple.
    Plants not succulent.
      Fls. in panicles: lvs. crenate or cleft ..... 2. *Saxifraga*
      Fls. borne singly on scapes: lvs. entire ..... 3. *Parnassia*
    Plants succulent ..... 4. *Chrysosplenium*
AA. Shrubs or trees.
  C. Fls. of two kinds, the marginal sterile and enlarged, or all the fls. sterile and enlarged: fr. a capsule.
    Lvs. opposite, pinnately veined.
      Sterile fls. with 3–4 sepals ..... 5. *Hydrangea*
      Sterile fls. with one large stalked sepal ..... 6. *Schizophragma*
    Lvs. alternate ..... 7. *Cardiandra*
  CC. Fls. all of one kind.
    D. Lvs. opposite.
      Evergreen shrubs: lvs. entire: petals falling off in a cap ..... 8. *Pileostegia*
      Deciduous shrubs: lvs. serrate or dentate: petals expanding.
        Stamens 2× the petals: lvs. serrate ..... 9. *Deutzia*
        Stamens numerous: lvs. dentate ..... 10. *Philadelphus*
    DD. Lvs. alternate, palmately lobed: fr. a berry ..... 11. *Ribes*

1. **Astilbe** Buch.-Ham. False Goat's Beard 升麻属 (Shên Ma Shu)

Strong perennial herbs with *2–3–ternately compound lvs.*: *fls. small, numerous*, polygamous, in dense terminal panicles: follicles dehiscent. About 14 species, in eastern Asia and eastern North America; 8 in China. (From the Greek terms meaning "without brightness.")

Key to the Species

Petals linear, pale rose or white: tomentum on axes of infl. dense, fuscous, glandular ..... 1. *A. austrosinensis*
Petals broadly spatulate, white: tomentum eglandular..... 2. *A. japonica*

1. **Astilbe austrosinensis** Hand.-Mazz. 升麻 (Shêng Ma; Rising Hemp) (H.-M. 7:414). Erect herb, to 1 m.; fls. pink-red, V–VII; fr. VI–VIII; lfts. rounded at base. China; locally in An., Che., Hon., Ki. Mountain meadows.
2. **Astilbe japonica** (Morr. & Decne.) A. Gray 泡盛草 (P'ao Shêng Ts'ao; Flourishing Herb) (B.M. 483). Erect herb, to 1 m.; fls. cream-white, VI–VII; lfts. cuneate at base. Japan, China; locally in An. Mountain meadows.

2. **Saxifraga** Linn. Saxifrage 虎耳草屬 (Hu Êrh Ts'ao Shu)

Weak herbs, mostly with a perennial caudex: *lvs. simple, crenate or cleft,* often basal or clustered; stem lvs. alternate: *fls.* bisexual, *in terminal panicles*; petals 5, entire; stamens 10; carpels 2. 400 species, in temperate and subarctic regions; 20 in China. (Latin: *saxum,* a rock; and *frangere,* to break.)

1. **Saxifraga sarmentosa** Linn. Strawberry Geranium 虎耳草 (Hu Êrh Ts'ao; Tiger's-ear Herb) (B.M. 487). Erect herb, 3–5 dm. high; fls. white or pinkish; petals very unequal. China, Japan; locally in An., Che., Hup., Ki., Ku, Moist shaded rocks. Fig. 142.

3. **Parnassia** Linn. Grass of Parnassus 白髮草屬 (Pai Hsü Ts'ao Shu)

Glabrous perennial herbs with *simple entire lvs.*: *fls. solitary,* on scapes; calyx lobes, petals and stamens 5; petals marcescent: fr. a capsule. 15 species, in north temperate and arctic regions; 11 in China. (From Mt. Parnassus of Greece.)

1. **Parnassia foliosa** Hook. f. & Thoms. 白髮草 (Pai Hsü Ts'ao; Whitebeard Herb) (H.F. 2:402). Erect herb, 1–4 dm. high; fls. white, VIII; petals fimbriate. Eastern Asia; locally in Ki. Mountain meadows.

4. **Chrysosplenium** Linn. Golden Saxifrage 貓眼草屬 (Mao Yen Ts'ao Shu)

Weak *succulent herbs*: fls. axillary and terminal; petals none: *capsule dehiscing crosswise* at the top. 22 species, in north temperate regions; 12 in China. (Greek: *chryso,* golden; and *splen,* spleen; referring to the form of the leaves.)

1. **Chrysosplenium alternifolium** Linn. 貓兜眼睛草 (Mao Êrh Yen Ching Ts'ao; Cat's-eye Herb) (Le. F. 2:226). Succulent herb, 5–20 cm. high; fls. VI. Northern Eurasia; locally in An. Moist meadows.

5. **Hydrangea** Linn. 八仙花屬 (Pa Hsien Hua Shu; Eight-fairies' Flower Genus)

Shrubs or small trees with *simple opposite lvs.*: *fls.* in terminal clusters, *the marginal ones* often *enlarged and sterile,* formed of 3–4 sepals. 35 species, in eastern Asia and the western hemisphere; over 20 in China. (Greek: *hydor,* water; and *aggeion,* vessel, referring to the shape of the capsule.)

Key to the Species

Infl. paniculate, not flat-topped..... 1. *H. paniculata*
Infl. flat-topped or hemispherical.
Infl. hemispherical: lvs. broadly ovate, 7–15 cm. long ..... 2. *H. macrophyllum* var. *hortensia*

Infl. flat-topped: lvs. narrowly ovate to oblong, 4–8 cm. long...3. *H. umbellata*

1. **Hydrangea paniculata** Sieb. 水亜木 (Shui Ya Mu) (R.M. 288). Shrub, 1–2m. high; fls. white, VI–VIII. Japan, China; locally in An., Ki. Woodland.
2. **Hydrangea macrophylla** (Thunb.) DC. var. **hortensia** (Regel) Rehd. 大八仙花 (Ta Pa Hsien Hua; Great Hydrangea) (R.M. 287). Shrub, to 1 m.; fls. bluish, VII. Japan, China; locally in An., Ku. Cultivated, ornamental.
3. **Hydrangea umbellata** Rehd. 繖形綉球花 (San Hsing Hsiu Ch'iu Hua; Umbellate Geranium) (Pl. W. 1:25). Shrub, 1–2 m. high; fls. greenish white, VI–VIII. China; locally in An., Ki. Woodland. Fig. 143.

6. **Schizophragma** Sieb. & Zucc. 鑽地風属 (Tsuan Ti Fêng Shu)

Woody vines climbing by aerial rootlets: *lvs. deciduous, opposite*: *sterile fls. composed of one large stalked sepal*: fr. a 10-ribbed capsule, opening between the ribs. 3 species, in eastern Asia; 2 in China. (Greek: *schizein*, to cleave; and *phragma*, wall, referring to the opening of the capsule.)

Key to the Species

Lf. blades entire ..... 1. *S. integrifolium*
Lf. blades coarsely denticulate ..... 2. *S. integrifolium* var. *denticulatum*

1. **Schizophragma integrifolium** Oliv. 全葉鑽地風 (Ch'üan Yeh Tsuan Ti Fêng) (R.M. 291). Climbing shrub; fls. white, VI–VII. Central and western China; locally in An., Che. Woodland. Fig. 144.
2. **Schizophragma integrifolium** var. **denticulatum** Rehd. 缺緣鑽地風 (Ch'üeh Yuan Tsuan Ti Fêng) (Pl. W. 1:42). Climber; fls. V. China; locally in An., Ki. Woodland.

7. **Cardiandra** Sieb. & Zucc. 紫陽花属 (Tzŭ Yang Hua Shu)

Shrubs with *alternate* coarsely serrate *lvs.*: *fls.* in corymbs, *the outer sterile and enlarged*; calyx limb 3-parted, corolline and veined; petals 5; styles 3. One species, in eastern Asia. (Greek: *cardia*, heart; and *andres*, of a man.)

1. **Cardiandra sinensis** Hemsl. 紫陽花 (Tzŭ Yang Hua; Bright Purple Flower) (Pl. W. 1:24). Erect shrub, 3–8 dm. high; fls. pink, VIII. China; locally in An., Che., Ki. Woodland shade.

8. **Pileostegia** Hook. f. & Thoms. 青棉花藤属 (Ch'ing Mien Hua T'êng Shu)

Evergreen glabrous trees and shrubs with *opposite entire lvs.*: fls. in terminal panicles, *all alike*; *petals* valvate, *forming a conical cap* which falls without expanding. One species, in eastern Asia. (Latin: *pileum*, a cap; and Greek: *stege*, a cover.)

1. **Pileostegia viburnoides** Hook. f. & Thoms. 青棉花藤 (Ch'ing Mien Hua T'êng; Green-cotton Vine) (R.M. 291). Evergreen shrub, to 2 m.; fls. VIII. Eastern Asia; locally in Che., Ki. Woodland.

9. **Deutzia** Thunb. 溲疏属 (Sou Su Shu)

Shrubs with hollow brts. and *opposite lvs.*: *fls.* in terminal clusters, *all fertile*; calyx lobes and petals 5; *stamens usually 10*; ovary inferior: fr. a 3–5-celled capsule. 50 species, mostly in eastern Asia; 40 in China. (After Johann van der Deutz, patron of Thunberg.)

Key to the Species

Petals imbricate in the bud ..... 1. *D. maliflora*
Petals valvate in the bud ..... 2. *D. scabra*

1. ×**Deutzia maliflora** Rehd. (*D. lemoinei*×*purpurascens*) (R.M. 283). Shrub, to 2 m.; fls. pinkish outside; petals imbricate. Garden origin, about 1903. Locally in Ku. Cultivated, ornamental.
2. **Deutzia scabra** Thunb. 溲疏 (Sou Su) (R.M. 278). Shrub, 1–2 m. high; fls. white, V; petals valvate. Japan, China; locally in An., Che., Hup., Ki., Ku. Brushland, and cultivated, ornamental. Fig. 145.

Deutzia Chunii Hu (R.M. 279) occurs in the mountainous borderland between Chekiang and Kiangsu. It has flowers in an open panicle and oblong-lanceolate leaves remotely and minutely serrulate.

10. **Philadelphus** Linn. Mock Orange 山梅花属 (Shan Mei Hua Shu)

Erect shrubs with *opposite lvs.*: *fls.* large, white or slightly colored, *fragrant*; sepals and petals 4; *stamens many*; ovary 4-celled, 40 species, of wide distribution; 10 or more in China. (Named for King Ptolemy Philadelphus of Egypt, 309–246 B.C., a patron of scientific research.)

Key to the Species

Calyx glabrous outside ..... 1. *P. coronarius*
Calyx pubescent outside.
Lvs. pubescent beneath ..... 2. *P. incanus*
Lvs. glabrous beneath ..... 3. *P. sericanthus*

1. **Philadelphus coronarius** Linn. 西洋山梅花 (Hsi Yang Shan Mei Hua; European Philadelphus) (R.M.271). Shrub, to 3 m.; fls. creamy-white, fragrant, VI. Introduced from Europe; locally in Ku. Cultivated, ornamental.
2. **Philadelphus incanus** Koehne 山梅花 (Shan Mei Hua; Mountain Plum) (R.M.268). Shrub, 1–3 m. high; fls. white, VII. Western and central China; locally in Hon., Ki. Brushland.
3. **Philadelphus sericanthus** Koehne 建德山梅花 (Chien Tê Shan Mei Hua) (R.M.269). Shrub, 1–3 m. high; fls. white, V. Central and western China; locally in An., Che., Ku., Ki. Rocky stream beds, and cultivated ornamental.

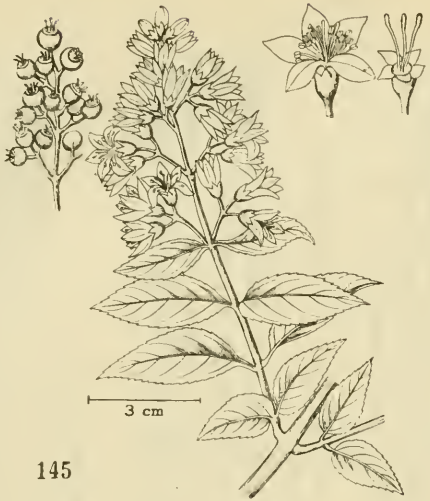
11. **Ribes** Linn. Currant Gooseberry 茶藨子属 (Ch'a Piao Tzŭ Shu; Tea-berries Genus)

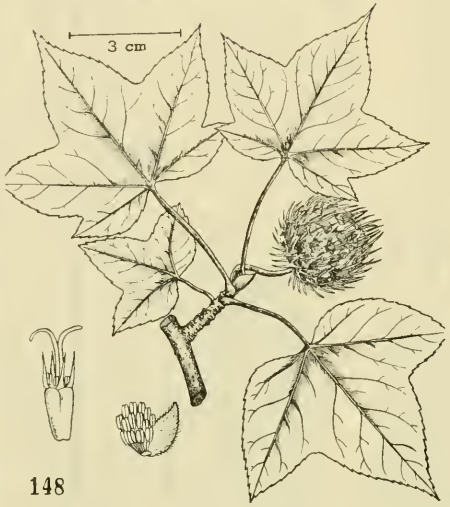
Shrubs with *alternate*, usually *palmately lobed lvs.*: fls. perfect or unisexual, usually in racemes; calyx often colored; petals inconspicuous or wanting; stamens 5, alternate with the petals; ovary inferior, 1-celled: *fr. a berry*. 150 species, mostly of north temperate regions; 35 in China. (From *ribas*, the Arabian name for *Rheum Ribes*.)

Key to the Species

Fls. in fascicles ..... 1. *R. fasciculatum*
Fls. in slender racemes ..... 2. *R. tenue*

1. **Ribes fasciculatum** Sieb. & Zucc. 藪山楂子 (Sou Shan Cha Tzŭ; Swamp Hawthorne) (R.M.297). Shrub, to 1 m.; fr. red or black, VIII–X. Eastern Asia;





145. Deutzia scabra
146. Pittosporum tobira
147. Fortunearia sinensis
148. Liquidambar formosana
149. Loropetalum chinense
150. Platanus acerifolia

locally in An., Ku. Woodland.

2. **Ribes tenue** Jacq. (R.M.296). Shrub, to 2.5 m.; fls. brownish red, IV. Western and central China, Himalayas; locally in An. Woodland.

77. PITTOSPORACEAE Pitchseed Family 海桐科 (Hai T'ung K'o)

Trees and shrubs, sometimes climbing, with *alternate evergreen lvs.*: fls. mostly regular; sepals, petals and stamens 5; ovary superior, of 2–5 carpels: fr. (in ours) a capsule. 9 genera with 150 species, mostly of Australia, but our genus distributed over the eastern tropics; one genus and 10 species in China.

1. **Pittosporum** Banks 海桐属 (Hai T'ung Shu)

Erect trees or shrubs with glabrous leathery lvs.: petals more or less joined together at the base: *fr. a dehiscent capsule* with resinous-*sticky*-coated *seeds*. 100 species, in the Old World Tropics; 10 in China. (From the Greek terms meaning "pitch" and "seed", referring to the resinous coating of the seeds.)

Key to the Species

Lvs. obovate to oblanceolate, slenderly pointed	1. *P. glabratum*
Lvs. rounded at the tip, tapering to a narrowly cuneate base	2. *P. tobira*

1. **Pittosporum glabratum** Lindl. 光叶海桐 (Kuang Yeh Hai T'ung; Smooth Pittosporum) (Be.F.19). Shrub, 1–3 m. high; fls. V; fr. VIII–X; seeds with orange aril. Eastern Asia; locally in An., Che., Ki. Woodland.
2. **Pittosporum tobira** (Willd.) Ait. Japanese Pittosporum 海桐 (Hai T'ung; Sea Aleurites) (B.M.488). Bush, 1–4 m. high; fls. cream-white, fragrant, V; fr. X; seeds with red aril. Japan, China; locally in An., Che., Ku. Cultivated, ornamental. Fig. 146.

78. HAMAMELIDACEAE Witch Hazel Family 金縷梅科 (Chin Lü Mei K'o)

Trees or shrubs with *alternate* simple *lvs.*: fls. in heads or racemes: *fr. a woody 2-celled capsule*: seeds with endosperm, one in each cell. 20 genera with 50 species, in the subtropical parts of Asia, South Africa, and North America; 13 genera and 30 species in China.

Key to the Genera

A. Deciduous trees and shrubs.	
B. Lvs. pinnately veined: fls. in racemes, or few, with petals.	
Lvs. with straight unbranched veins: petals broad	1. *Corylopsis*
Lvs. with brg. veins: petals very small, sharp-pointed.	
Fls. in racemes, 5-merous	2. *Fortunearia*
Fls. in clusters, 4-merous	3. *Hamamelis*
BB. Lvs. palmately lobed: fls. many, in dense clusters, without petals	4. *Liquidambar*
AA. Evergreen trees or shrubs.	
Petals wanting: erect tree or shrub	5. *Distylium*
Petals strap-shaped: decumbent shrub	6. *Loropetalum*

1. **Corylopsis** Sieb. & Zucc. 瑞木属 (Shui Mu Shu; Auspicious Wood Genus)

Deciduous shrubs or small trees: *lvs. pinnately veined*, with *straight unbranched veins*: fls. in drooping racemes, appearing before the lvs.; petals 5, broad; ovary half-inferior: capsule broad, glabrous, bearing two shiny black seeds. 12 species, in

Asia; 9 in China. (From *Corylus*; and the Greek term *opsis*, likeness, because the foliage resembles that of the hazel nut.)

KEY TO THE SPECIES

Young brts. and lvs. glabrous..... 1. *C. platypetala*
Young brts. and petioles pubescent: lvs. pubescent beneath..... 2. *C. sinensis*

1. **Corylopsis platypetala** Rehd. & Wils. (R.M.316). Shrub, to 3.5 m.; fr. IX. Central China; locally in An., Che. Woodland.
2. **Corylopsis sinensis** Hemsl. 蠟瓣花 (La Pan Hua; Wax-petal Flower) (R.M.315). Shrub, to 5 m.; fls. IV. Central and western China; locally in An., Ki. Woodland.

2. **Fortunearia** Rehd. & Wils. 牛鼻栓属 (Niu Pi Shuan Shu)

A deciduous andro-monoecious shrub: *lvs. pinnately veined*, with *brg. veins*: fls. in racemes, appearing with the lvs.; *petals small and sharp-pointed*: capsule glabrous, bearing two shiny brown seeds. One species, in China. (For Robert Fortune, an English horticulturist who travelled in China during 1843–61, and introduced many new plants from China to the West.)

1. **Fortunearia sinensis** Rehd. & Wils. 牛鼻栓 (Niu Pi Shuan; Ox-nose Peg) (R.M. 317). Shrub, 1–3 m. high; fls. IV–V; fr. X–XI. Central China; locally in An., Che., Ku. Woodland. Fig. 147.

3. **Hamamelis** Linn. WITCH HAZEL 全緣梅属 (Chin Lü Mei Shu)

Deciduous trees or shrubs with terete zigzag brts. and stellate pubescence: *fls.* perfect, *in* axillary few-fld. *clusters*, *4-merous*; *petals linear*; stamens alternating with scale-like staminodes: capsule 2-valved, 2-seeded. 6 species, in North America and eastern Asia; one in China. (Ancient Greek name of a pear-shaped fr., probably the medlar.)

1. **Hamamelis mollis** Oliv. 金縷梅 (Chin Lü Mei; Golden-thread Plum) (R.M.319). Shrub or small tree, to 10 ; fls. I–III; fr. X; lvs. densely pubescent. Central China; locally in An., Ki. Woodland.

4. **Liquidambar** Linn. SWEET GUM 楓香樹属 (Fêng Hsiang Shu Shu)

Deciduous usually monoecious *trees* with *palmately lobed lvs.*: *fls.* many, *in* dense globose *head-like clusters*, apetalous, the staminate without perianth: fr. a globular head, covered by persistent spiny styles, the small capsules bearing winged seeds. 4 species, in North and Central America, and in Asia; one in China. (Latin: *liquidus*, fluid; and *ambar*, amber, referring to the fragrant oleoresin from the bark of *L. orientalis*.)

1. **Liquidambar formosana** Hance 楓香樹 (Fêng Hsiang Shu; Fragrant Maple) (R.M.312). Tree, to 40 m.; fls. IV; fr. VIII–X; lvs. usually 3-lobed. China, Formosa; locally in An., Che., Ki., Ku. Valley woods. Fig. 148.

5. **Distylium** Sieb. & Zucc. 蚊母樹属 (Wên Mu Shu Shu; Mother-of-mosquitoes Tree Genus)

Evergreen trees or shrubs: fls. in axillary racemes, polygamous or dioecious, *apetalous*, subtended by small bracts; stamens 2–8, almost spoon-shaped; ovary

superior: fr. a 2-celled capsule with one seed in each cell. 6 species, in Japan, China and the Himalayas; 4 in China. (Greek: *dis*, two; and *stylos*, style, referring to the two conspicuous styles.)

1. **Distylium myricoides** Hemsl. (Lee 576). Evergreen tree, to 9.5 m.; fr. IX; capsule grayish-pubescent. China; locally in An., Che. Woodland.

6. **Loropetalum** R. Br. 檵花属 (Chi Hua Shu)

Evergreen shrubs with small entire lvs.: fls. in terminal fascicles; *petals* linear, *strap-shaped*: capsules densely pubescent. Two species, in China. (Greek: *loros*, a strap; and *petalum*, referring to the strap-shaped petals.)

1. **Loropetalum chinense** (R.Br.) Oliv. 檵花 (Chi Hua) (B.M.491). Woody vine; fls. white, IV. Central and southeastern China; locally in An., Che., Ki. Ku. Brushland and woods. Fig. 149.

79. **PLATANACEAE** Plane Tree Family 法国梧桐科 (Fa Kuo Wu T'ung K'o)

Deciduous *monoecious trees* with alternate *palmately lobed lvs.* and stellate pubescence: buds at first covered by the base of the petiole: *fls. small, in globular heads*; perianth very small: *fr. a spherical syncarp* composed of many 1-seeded nutlets, each with long hairs at the base. One genus with 6–7 species, in North America and Eurasia; 2–3 species cultivated in China.

1. **Platanus** Linn. Sycamore 法国梧桐属 (Fa Kuo Wu T'ung Shu; French Firmiana Genus)

Characters of the family. (The Greek name for the tree, from *platys*, broad.

1. ×**Platanus acerifolia** Willd. (*P. occidentalis*×*orientalis*) London Plane Tree 英国梧桐 (Ying Kuo Wu T'ung; English Firmiana) (R.M.321). Tree, to 40 m.; fls. IV; frtg. heads usually two. Hybrid origin; locally in An., Ku. Cultivated, ornamental. Fig. 150.

80. **ROSACEAE** Rose Family 薔薇科 (Ch'iang Wei K'o)

Plants with mostly *alternate stipular lvs.*: *fls.* usually *perfect, regular and perigynous or epigynous*: the receptacle developing into a flat, urn-shaped or conical hypanthium, usually lined with a glandular disc: sepals and petals 4–5; stamens 5–many; *carpels 1–many*, distinct or united with the receptacle: fr. a follicle, achene, drupe, hip, or pome. About 100 genera with 2,000 species, widely distributed, especially in the temperate parts of the world; about 30 genera and 200 species in China.

Key to the Genera

A. Fls. perigynous.
  B. Hypanthium cup-shaped, without a central column.
    C. Fr. becoming capsules or follicles. I. Spiraeoideae.
      Fr. a capsule: fls. large, 2 cm. or more in diam. ..... 1. *Exochorda*
      Fr. follicular: fls. small.
        Stipules present: carpels one..... 2. *Stephanandra*
        Stipules wanting: carpels usually 5..... 3. *Spiraea*
    CC. Fr. a drupe. II. Prunoideae ..... 4. *Prunus*

BB. Hypanthium shallow and with a central column, or deep and urn-shaped. III. Rosoideae.
D. Petals none; flowers in dense cylindric spikes ..... 5. *Sanguisorba*
DD. Petals present; flowers not in cylindric spikes.
E. Hypanthium shallow, with a central column.
F. Lvs. simple.
Fls. white: leaves opposite..... 6. *Rhodotypus*
Fls. yellow: leaves alternate ..... 7. *Kerria*
FF. Lvs. compound.
G. Style deciduous, not elongating in fr.
H. Fr. dry.
Achenes two, enclosed in a dry hardened calyx tube bearing a row of hooked bristles at the top: fls. in long racemes ..... 8. *Agrimonia*
Achenes many, not enclosed: fls. solitary, or in cymes ..... 9. *Potentilla*
HH. Fr. fleshy.
Column of the hypanthium greatly enlarged in fr.: herbs.
Hypanthium very fleshy: flowers white.. 10. *Fragaria*
Hypanthium rather pithy: flowers yellow ..... 11. *Duchesnea*
Column of the hypanthium not greatly enlarged, shrubs, mostly armed with spines or prickles ..... 12. *Rubus*
GG. Style persistent, elongating in fr. ..... 13. *Geum*
EE. Hypanthium urn-shaped, enclosing the achenes: mostly prickly shrubs ..... 14. *Rosa*
AA. Fls. epigynous: fr. a pome. IV. Pomoideae.
I. Fr. with stony carpels.
Stony carpels 2-seeded.
Plants without thorns: leaves entire ..... 15. *Cotoneaster*
Plants thorny: leaves crenulate ..... 16. *Pyracantha*
Stony carpels 1-seeded ..... 17. *Crataegus*
II. Fr. with leathery or papery carpels.
J. Carpels of the fr. several-seeded.
Fls. appearing with the lvs.; styles free: lvs. entire .... 18. *Cydonia*
Fls. appearing before the lvs; styles connate at the base: lvs. serrate or crenate ..... 19. *Chaenomeles*
JJ. Carpels of the fr. 1-2-seeded.
K. Carpels joined together: fr. very fleshy..... 20. *Eriobotrya*
KK. Carpels more or less free.
L. Infl. compound, often flat-topped.
Fr. open at the top ..... 21. *Photinia*
Fr. closed at the top ..... 22. *Sorbus*
LL. Infl. simple, racemose or umbellate.
Ovary and fruit 2–5-celled; cells 2-ovuled.
Fr. usually apple-shaped: grit cells few or none: styles united at the base ..... 23. *Malus*
Fr. usually pear-shaped: grit cells numerous: styles distinct to the base..... 24. *Pyrus*
Ovary and fruit incompletely 6-10-celled; cells 1-ovuled ..... 25. *Amelanchier*

I. **Spiraeoideae** Spirea Subfamily 珍珠梅亞科 (Chên Chu Mei Ya K'o)

Shrubs or trees: *hypanthium like a* shallow *cup*: *ovary* or ovaries *superior*: *fr. a capsule or follicle*, sometimes an achene.

1. **Exochorda** Lindl. 白鵑梅屬 (Pai Chüan Mei Shu)

Deciduous *shrubs* with *simple lvs.*: *fls. white, up to 5 cm. in diam.*, in terminal racemes: hypanthium broadly turbinate: calyx 5-lobed; petals 5, clawed; stamens 15–30, inserted on a disk; ovary superior: *fr. a 5-celled deeply furrowed* bony *capsule*; each cell with 1–2 winged seeds. 4 species, in Asia; 3 in China. (Greek: *exo*, external; and *chorde*, chord, referring to the fibers on the outer part of the placenta.)

1. **Exochorda racemosa** (Lindl.) Rehd. Pearl Bush 白鵑梅 (Pai Chüan Mei; White-goatsucker Plum) (R.M.346). Shrub, 1–3 m. high; fls. white, III–IV; petals with a short claw; fr. VII. Western China; locally in An., Che., Hon., Ku. Brush-land.

2. **Stephanandra** Sieb. & Zucc. 小米空木屬 (Hsiao Mi K'ung Mu Shu)

Deciduous shrubs: *lvs.* 2-ranked, *stipulate*, serrate and often lobed: *fls.* in terminal panicles, *small*, white on slender pedicels; calyx lobes and petals 5; stamens 10–20, persistent: fr. a 1–2-seeded oblique *follicle*. 4 species, in eastern Asia; 2 in China. (Greek: *stephanos*, crown; and *andros*, man, referring to the persistent crown of stamens.)

1. **Stephanandra chinensis** Hance 小米空木 (Hsiao Mi K'ung Mu; Millet-cavity Tree, (Pl. W. 1:437). Shrub, 1–3 m. high; fls. V–VI. China; locally in An., Che., Hon.) Ki. Woodland.

3. **Spiraea** Linn. Spirea 珍珠梅屬 (Chên Chu Mei Shu)

Deciduous shrubs with *estipulate lvs.* and 5-merous *fls. in umbel-like racemes* or panicles: hypanthium cup-shaped or bell-shaped: stamens 15–60: fr. usually of *5 distinct follicles*: seeds numerous and minute. 80 species, in north temperate regions about 50 in China. (Greek: *speira*, wreath.)

Key to the Species

a. Infl. compound: fls. pink or red ..... 1. *S. japonica*
aa. Infl. in simple umbels or umbel-like racemes.
  b. Infl. in sessile umbels, bearing few lvs. or none ..... 2. *S. prunifolia*
  bb. Infl. of umbel-like racemes on leafy branches.
    Lvs. glabrous and glaucous.
      Lvs. obtuse, often lobed ..... 3. *S. blumei*
      Lvs. acute, sharply serrate ..... 4. *S. cantoniensis*
    Lvs. pubescent beneath ..... 5. *S. chinensis*

1. **Spiraea japonica** Linn. f. 日本繡線菊 (Jih Pên Hsiu Hsien Chü; Japanese Embroidered-chrysanthemum) (R.M.337). Shrub, 5–10 dm. high; fls. pink, VI–VII. Eastern Asia; locally in An., Che., Ki., Ku. Meadows and brushland.
2. **Spiraea prunifolia** Sieb. & Zucc. Bridal Wreath 笑靨花 (Hsiao Yeh Hua; Laughing-face Flower) (R.M.329). Shrub, to 1 m.; fls. white, IV. China, Korea, Formosa; locally in Ku. Cultivated, ornamental.

3. **Spiraea blumei** G. Don 珍珠繡球 (Chên Chu Hsiu Ch'iu; Pearl Geranium) (R.M. 333). Shrub, 5–10 dm. high; fls. white, IV. Japan, Korea, China; locally in An., Che., Ki., Ku. Brushland.
4. **Spiraea cantoniensis** Lour. 麻葉繡球 (Ma Yeh Hsiu Ch'iu; Hemp-leaved Geranium) (R.M.333). Shrub, to 1 m.; fls. white, V. China, Japan; locally in An., Ku. Cultivated, ornamental. Fig. 151.
5. **Spiraea chinensis** Maxim. 鉄黒漢條 (T'ieh Hei Han T'iao; Black-iron Branches) (R.M.334). Shrub, 1–2 m. high; fls. white, IV–V. Eastern China; locally in An., Che., Hup., Ki., Ku. Brushland.

II. **Prunoideae** Peach Subfamily 櫻亜科 (Ying Ya K'o)

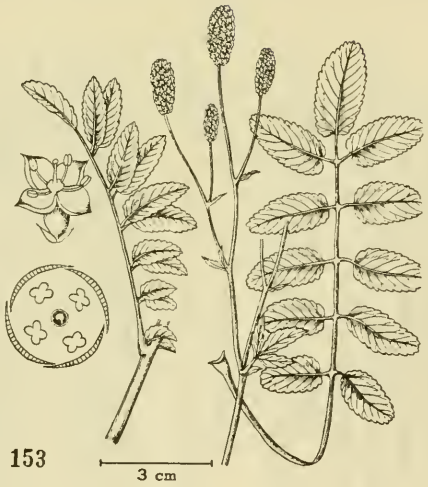
Shrubs or trees: *hypanthium cup-shaped*: *ovary superior*: *fr. a drupe.*

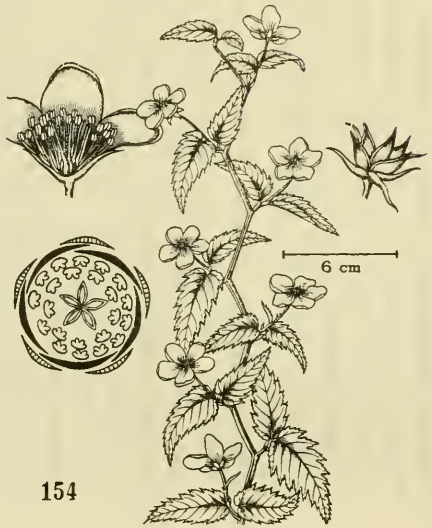
4. **Prunus** Linn. Stone Fruits 桃属 (T'ao Shu)

Trees or shrubs with *stipulate* usually serrate *lvs.* and white, red or pink 5-merous fls. in fascicles or racemes; stamens numerous, perigynous: *fr. a drupe.* 200 species, in temperate regions; 125 in China. (The Latin name.)

Key to the Species

a. Fr. deeply grooved.
  b. Winter buds solitary in the lf. axils: stone neither pitted nor grooved.
    Fr. glabrous: lvs. oblong- or elliptic-ovate ..... 1. *P. salicina*
    Fr. pubescent, at least when young: lvs. broadly orbicular-ovate.
      Brts. reddish: stone smooth, more or less flattened ..... 2. *P. armeniaca*
      Brts. greenish: stone pitted, not flattened..... 3. *P. mume*
  bb. Winter buds 3 in the lf. axils: stone pitted or furrowed.
    Stone large and more or less compressed ..... 4. *P. persica*
    Stone small and nearly spherical ..... 5. *P. davidiana*
aa. Fr. not noticeably grooved.
  c. Fls. solitary or few in a cluster.
    d. Axillary buds 3.
      e. Lvs. tomentose beneath ..... 6. *P. tomentosa*
      ee. Lvs. glabrous or pubescent, not tomentose.
        Lvs. lanceolate; petioles 2–3 mm. long ..... 7. *P. glandulosa*
        Lvs. ovate; petioles 3–5 mm. long.
          Lateral veins not extending to the leaf margins .. 8. *P. humilis*
          Lateral veins running to the leaf margins..... 9. *P. japonica*
    dd. Axillary buds solitary.
      f. Fls. before the leaves.
        Fls. white ..... 10. *P. pseudocerasus*
        Fls. light pink ..... 11. *P. subhirtella*
      ff. Fls. with the lvs.
        g. Sepals erect or spreading.
          Pedicels, calyx and style glabrous.
            Serrations of the leaf acute or acuminate .... 12. *P. serrulata*
            Serrations of the leaf ending in long teeth .. 13. *P. serrulata* var. *lannesiana*
          Pedicels, calyx and styles pubescent..... 14. *P. yedoensis*
        gg. Sepals reflexed: stipules persistent, linear, glandular-fimbriate ..... 15. *P. dielsiana*
  cc. Fls. small, in elongated racemes ..... 16. *P. perulata*





151. Spiraea cantoniensis
152. Prunus mume

153. Sanguisorba officinalis
154. Kerria japonica

155. Agrimonia eupatoria
156. Fragaria chiloensis

1. **Prunus salicina** Lindl. Plum 李 (Li) (R.M.457). Tree, to 10 m.; fls. white, IV; fr. yellow or green, glabrous. China; locally in An., Hon., Ku. Cultivated, fruit.
2. **Prunus armeniaca** Linn. Apricot 杏 (Hsing) (R.M.462). Tree, to 10 m.; fls. white or pinkish, IV; fr. yellow, tinged red. Western Asia; locally in Ku. Cultivated, fruit.
3. **Prunus mume** Sieb. & Zucc. Flowering Apricot 梅 (Mei) (R.M.462). Shrub or tree, to 10 m.; fls. light pink, III; fr. yellow or green. Japan, China; locally in Ku. Planted, ornamental. Fig. 152.
4. **Prunus persica** (L.) Batsch Peach 桃 (T'ao) (R.M.463). Tree, to 8 m.; fls. pink, red, white or variegated, IV. China; locally in An., Che., Hon., Ki., Ku. Cultivated, ornamental, fruit.
5. **Prunus davidiana** Franch. 山毛桃 (Shan Mao T'ao; Mountain Hairy-peach) (R.M.464). Tree, to 10 m.; fls. light pink, III–IV; fr. yellowish. China; locally in Ku.
6. **Prunus tomentosa** Thunb. 梅桃 (Mei T'ao; Plum Peach) (R.M.466). Shrub, to 3 m.; fls. white or pinkish, III–IV; fr. VI–VII. Northern and western China, Japan, Himalayas; locally in An., Ku. Brushland and cultivated, ornamental.
7. **Prunus glandulosa** Thunb. Flowering Almond 麥李 (Mai Li; Wheat Plum) (R.M.467). Shrub, to 1.5 m.; fls. pink or white, V; fr. red. Central and northern China, Japan; locally in An., Ku. Cultivated, ornamental.
8. **Prunus humilis** Bunge 欧李 (Ou Li) (R.M.468). Shrub, 1.5 m. high; fls. white or pinkish; fr. red; lvs. finely serrate or crenulate. Northern China; locally in An. Rocky hillsides.
9. **Prunus japonica** Thunb. Dwarf Flowering Cherry 郁李 (Yü Li; Elegant Plum (R.M.467). Shrub, to 1.5 m.; fls. pink; fr. wine-red; lvs. doubly serrate. Eastern Asia; locally in An., Che., Ku. Woodland.
10. **Prunus pseudocerasus** Lindl. Cherry 櫻桃 (Ying T'ao) (R.M.473). Tree, to 8 m.; fls. white, IV; fr. red; involucre and stipules deciduous. China; locally in An., Ku. Cultivated, fruit.
11. **Prunus subhirtella** Miq. Rosebud Cherry 日本早櫻 (Jih Pên Tsao Ying; Japanese Early Cherry) (B.H.2nd.603). Tree, to 20 m.; fls. light pink, IV; fr. black; petals emarginate. Japan, China; locally in An. Woodland.
12. **Prunus serrulata** Lindl. Flowering Cherry 櫻花 (Ying Hua) (R.M.472). Tree, to 25 m.; fls. white or light pink, IV; fr. black; lvs. doubly serrate. Japan, China, Korea; locally in An., Che., Ku. Planted, ornamental.
13. **Prunus serrulata** var. **lannesiana** (Carr.) Rehd. 日本晚櫻 (Jih Pên Wan Ying; Japanese Late-flowering Cherry) (R.M.472). Tree, to 10 m.; fls. pink or white, IV; fr. black. Japan; locally in Ku. Planted, ornamental.
14. **Prunus yedoensis** Matsum. 東京櫻花 (Tung Ching Ying Hua; Japanese Flowering Cherry) (R.M.471). Tree, to 16 m.; fls. white or pink, IV; fr. black. Japan; locally in Ku. Planted, ornamental.
15. **Prunus dielsiana** Schneid. 尾葉櫻 (Wei Yeh Ying; Tailed-leaf Cherry) (R.M.473). Tree, to 10 m.; fls. pink or white, IV; fr. red, bracts and stipules glandular-fimbriate. China; locally in An. Woodland.
16. **Prunus perulata** Koehne (R.M.480). Tree, to 20 m.; fr. dark red, VI. Western China; locally in An. Woodland.

III. **Rosoideae** Rose Subfamily 薔薇亞科 (Ch'iang Wei Ya K'o)

Shrubs or herbs: *hypanthium saucer-shaped and with a central column, or urn-*

shaped: *carpels superior, numerous*, borne on the outside of the central column, or on the inside of the urn-shaped hypanthium.

5. **Sanguisorba** Linn. Burnet 地榆属 (Ti Yü Shu)

Polygamous or dioecious perennial herbs with alternate pinnately compound lvs.: *fls.* small, *in a dense terminal spike or head* at the top of a long naked peduncle; *petals none*: fr. usually a single achene enclosed in the 4-angled calyx tube. 35 species, in the north temperate zone; 4 in China. (Latin: *sanguis*, blood; and *sorbere*, to drink up, referring to the supposed medicinal value of the plant to stop bleeding.)

1. **Sanguisorba officinalis** Linn. 地榆 (Ti Yü; Ground Elm) (G.M.868). Erect herb, to 1 m.; fls. reddish purple, VII–VIII; spikes ovoid. Eurasia; locally in An., Ki., Ku. Meadows and grassland. Fig. 153.

6. **Rhodotypus** Sieb. & Zucc. 鸡麻属 (Chi Ma Shu)

A *deciduous shrub* with simple *opposite* serrate *lvs.*: *fls. solitary, white*, 3–5 cm. in diam.; sepals and petals usually 4; stamens numerous; carpels 4, becoming *black drupes in fr.*, and surrounded by the large persistent calyx. One species, in eastern Asia. (Greek: *rhodon*, rose; and *typon*, type.)

1. **Rhodotypus scandens** (Thunb.) Mak. 鸡麻 (Chi Ma; Chicken Hemp) (R.M.407). Shrub, to 5 m.; fls. white, IV–V; fr. black, X. Japan, Central China; locally in An., Ku. Planted, ornamental.

7. **Kerria** DC. 棣棠花属 (Ti T'ang Hua Shu)

A *deciduous shrub* with simple *alternate* serrate *lvs.*: *fls.* solitary, *yellow*, 3–5 cm. across; sepals and petals 5; stamens many; carpels 5–8, becoming *achenes in fr.* One species, in China. (Named for Wm. Kerr, gardener and collector of Kew. died 1814.)

1. **Kerria japonica** (L.) DC. 棣棠花 (Ti T'ang Hua; Older-brother Flower) (R.M.406). Shrub, to 1 m.; fls. yellow, IV; fr. VIII. China; locally in An., Che., Ki., Ku. Planted, ornamental, and woodland. Fig. 154.

8. **Agrimonia** Linn. Agrimony 龍牙草属 (Lung Ya Ts'ao Shu)

Perennial herbs with pinnately *compound lvs.*: fls. in *slender spike-like racemes*, with 3-cleft bracts; petals 5, yellow; stamens 5–15; calyx tube hemispherical, obconic or turbinate, with *hooked bristles* at the top, in fr. enclosing the two achenes, 5-lobed at the top. 15 species, mostly of north temperate regions; one in China. (An old Latin name.)

1. **Agrimonia eupatoria** Linn. 龍牙草 (Lung Ya Ts'ao; Dragon-tooth Plant) (G.M. 867). Herb, 5–10 dm. high; fls. yellow, VII–VIII; fr. VIII–IX. North temperate zone; locally in An., Che., Hon., Ki., Ku. Waste ground. Fig. 155.

9. **Potentilla** Linn. Five-finger 委陵菜属 (Wei Ling Ts'ai Shu)

Herbs and shrubs with compound lvs. and *solitary or clustered fls.*: calyx flat, 5-cleft, *with bractlets in the sinuses* alternating with the calyx lobes; *petals* 5, *yellow or white*; stamens many: receptacle *dry in fr.* bearing many small achenes. Over

200 species, in north temperate and cold regions; over 25 in China. (Latin: ***potens***, powerful, referring to the supposed medicinal power of *P. anserina*.)

KEY TO THE SPECIES

a. Lvs. white tomentose beneath.
  Calyx and pedicels white tomentose: plant weak: lvs. mostly basal..... 1. *P. discolor*
  Calyx and pedicels pubescent, but not white tomentose: plant erect, stout; stems leafy..... 2. *P. chinensis*
aa. Lvs. more or less pubescent, but not white tomentose.
  Fls. large, 1–2 cm. across: plants conspicuously stoloniferous: lfts. mostly obovate ..... 3. *P. fragarioides*
  Fls. small, 6–10 mm. across: plants sometimes rooting at the nodes, but not conspicuously stoloniferous: lfts. mostly oblong or cuneate.
    Lfts. serrate or dentate, 1.5–3 cm. long..... 4. *P. kleiniana*
    Lfts. deeply incised or cleft, 6–20 mm. long ..... 5. *P. supina*

1. **Potentilla discolor** Bunge 翻白草 (Fan Pai Ts'ao; White-beneath Plant) (Mak. F.452). Prostrate herb; fls. yellow, III–IV; fr. V. Northern China, Japan; locally in Ki., Ku., Che. Open hills.
2. **Potentilla chinensis** Ser. 委陵菜 (Wei Ling Ts'ai) (Mak.F.453). Erect herb, to 1 m.; fls. yellow, V–VII; fr. VII–VIII. China, Japan; locally in An., Hon., Ku. Open hills.
3. **Potentilla fragarioides** Linn. 雉子筵 (Chih Tzŭ Yen; Pheasant's Feast) (H.F. 2:350). Stoloniferous herb; fls. yellow, 1–2 cm. across, III–IV. Eastern Asia; locally in An., Che., Ku. Open hills.
4. **Potentilla kleiniana** Wight & Arn. 蛇含 (Shê Han; Herb-from-the-mouth-of-a-snake) (H.F.2:359). Prostrate herb; fls. yellow, VI–VII. Eastern Asia; locally in An., Che., Ki., Ku. Open hills.
5. **Potentilla supina** Linn. 仰臥委陵草 (Yang Wu Wei Ling Ts'ao; Decumbent Potentilla) (H.F.2:359). Weak herb, 2–8 dm. high; fls. yellow, V–VI. Northern hemisphere; locally in Hon., Ki., Ku. Open hills.

10. **Fragaria** Linn. STRAWBERRY 草莓屬 (Ts'ao Mei Shu)

Perennial *herbs with runners*: *lvs. 3-foliolate*; lfts. wedge-shaped, coarsely serrate: *fls. white*, in raceme-like clusters on scapes: *receptacle* becoming *fleshy in fr.*, bearing numerous achenes. 20–30 species, mostly in the north temperate zone; 5 in China. (Latin: *fragran*, fragrance, on account of the odor of the fr.)

1. **Fragaria chiloensis** Duchesne var. **ananassa** Bailey 草莓 (Ts'ao Mei; Strawberry) (B.M.526). Stoloniferous herb; fls. white, IV; fr. red, V; achenes sunken in pits. Western America; locally in An., Ki., Ku. Cultivated, fruit. Fig. 156.

11. **Duchesnea** Sm. INDIAN STRAWBERRY 蛇莓屬 (Shê Mei Shu)

Herbaceous perennials with lfy. runners, 3-foliolate lvs. and *yellow fls.*: *receptacle spongy*: otherwise similar to *Fragaria*. Two species, in southern Asia; one in China. (Named for A. N. Duchesne, who monographed *Fragaria* in 1766.)

1. **Duchesnea indica** (Andr.) Focke INDIAN STRAWBERRY 蛇莓 (Shê Mei; Snake Strawberry) (G.M.803). Stoloniferous herb; fls. yellow, III–IV; fr. red, V–VIII; epicalyx

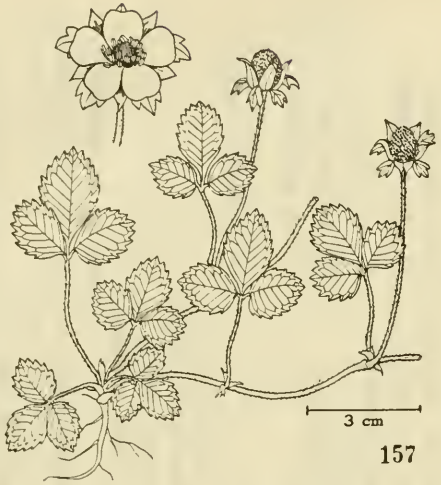
enlarged. Southern and eastern Asia; locally in An., Ki., Ku. Roadsides and meadows. Fig. 157.

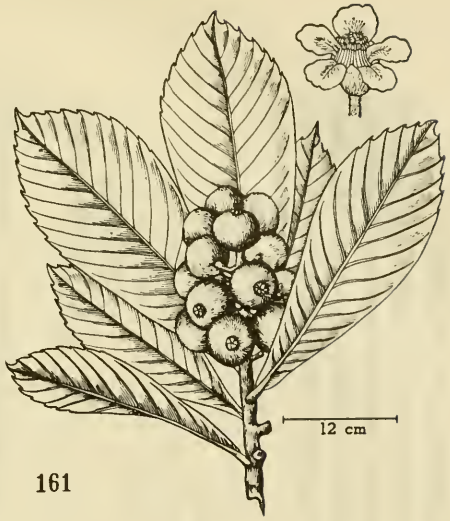
12. **Rubus** Linn. Brambles 懸鈎子屬 (Hsüan Kou Tzŭ Shu)

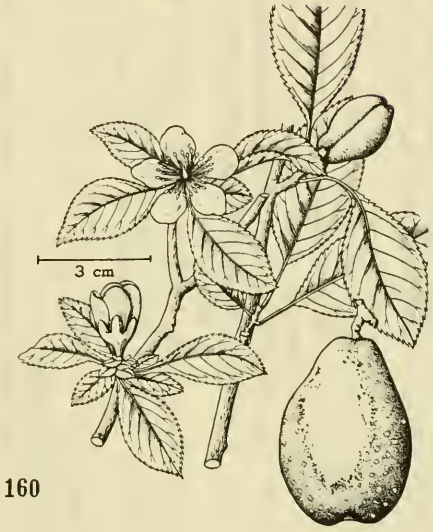
Erect or climbing deciduous or evergreen *shrubs* (ours) or herbs, mostly with *prickly stems*: lvs. alternate, simple or compound: infl. various: fls. mostly 5-parted, white, pink or red; calyx persistent, without bractlets: *receptacle* convex, *not much enlarged*, bearing an *aggregate fr. of 1-seeded drupelets*. 500 species, widely distributed; 150 in China. (Latin: *ruber*, red.)

Key to the Species

a. Lvs. simple.
  b. Fls. large and solitary, on the ends of lfy. branches.
    Lvs. deeply 3–5-lobed or cleft ..... 1. *R. chingii*
    Lvs. serrate, not lobed or cleft ..... 2. *R. corchorifolius*
  bb. Fls. in panicles or racemes.
    c. Lvs. densely tomentose beneath.
      Lvs. ovate, often slightly angled. gray-tomentose and coarsely reticulate beneath; nerves dark brown.... 3. *R. pacificus*
      Lvs. broadly ovate to nearly orbicular in outline, conspicuously angled or lobed; veins and petioles, as well as lf. blades, white-tomentose ..... 4. *R. tephrodes*
    cc. Lvs. glabrous or pubescent, but not tomentose.
      Calyx tomentose; calyx and pedicels glandular-prickly. 5. *R. hupehensis*
      Calyx and pedicels glabrous or pubescent, not tomentose or glandular.
        Lvs. lobed and finely dentate, pubescent beneath: calyx pubescent outside ..... 6. *R. lambertianus*
        Lvs. doubly and sharply serrate, glaucous beneath: calyx glabrous outside, tomentose in the sinuses and within ..... 7. *R. trianthus*
aa. Lvs. compound.
  d. Lvs. mostly trifoliolate, at least those of the frtg. brs.
    e. Fls. large and solitary, or in loose clusters of 2–5.
      Fls. solitary on the ends of lfy. lateral brs.: fr. red .. 8. *R. thunbergii*
      Fls. solitary, or in loose clusters of 2–5: fr. black ..... 9. *R. canadensis*
    ee. Fls. smaller and several to many, variously arranged.
      f. Pedicels and sometimes the calyx prickly.
        Calyx and pedicels puberulent, not glandular..... 10. *R. occidentalis*
        Calyx and pedicels glandular-hairy ..... 11. *R. parvifolius*
      ff. Pedicels and calyx not prickly.
        Calyx and pedicels glandular-hairy ..... 12. *R. phoenicolasius*
        Calyx and pedicels densely hairy, not glandular.
          Calyx and pedicels densely brown-hairy: plant unarmed or with very small weak prickles .. 13. *R. irenaeus*
          Calyx densely white-tomentose: plant sparingly prickly ..... 14. *R. kulinganus*
  dd. Lvs. mostly 5–7-foliolate (sometimes trifoliolate on frtg. brs.)
    Calyx glandular-hairy.
      Brts., petioles, pedicels and calyx covered with long stiff twisted gland-tipped hairs ..... 15. *R. rosaefolius*
      Brts. and petioles pubescent, not glandular: pedicels and







157. Duchesnea indica
158. Crataegus cuneata
159. Cydonia oblonga
160. Chaenomeles lagenaria
161. Eriobotrya japonica
162. Photinia serrulata

calyx tomentose and sparingly glandular-hairy ..... 16. *R. innominatus*
Calyx pubescent, not glandular ..... 17. *R. coreanus*

1. **Rubus chingii** Hu (*R. chungii* Hu) (AA.J.6:141;7:70). Shrub, to 1 m.; fls. solitary, V; fr. red. China; locally in An., Che. Woodland.
2. **Rubus corchorifolius** Linn. f. 山莓 (Shan Mei; Mountain Strawberry) (R.M. 412). Shrub; fls. white, solitary, IV; fr. red, VI. Japan, China; locally in An., Che., Ku. Woodland.
3. **Rubus pacificus** Hance (J.B. 1874:259). Shrub, to 5 dm.; fls. white, VI; fr. red, VIII. East Central China; locally in An., Che., Hon., Ki. Woodland shade.
4. **Rubus tephrodes** Hance (J.B. 1874:260). Scandent shrub; fls. VIII; fr. black, X. Eastern and southern China; locally in Ki.
5. **Rubus hupehensis** Oliv. 木莓 (Mu Mei; Woody Strawberry) (R. M.410). Scandent shrub; fls. white, V; fr. dark purple, VI. Formosa, China; locally in An. Thickets.
6. **Rubus lambertianus** Ser. 高粱泡 (Kao Liang P'ao; Kao-liang Bubbles) (R.M.411). Scandent shrub; fls. white, VIII–IX; fr. red, X–XI. Central China; locally in An., Che., Hup., Ku. Thickets.
7. **Rubus trianthus** Focke (R. M.413). Shrub; fls. white, V; fr. red, VII. China; locally in An., Ki. Thickets.
8. **Rubus thunbergii** Sieb. & Zucc. 蓬藥 (P'êng Lei; Tangled Creeper) (Mak. F.459). Shrub, 1 m. high; fls. white, IV–V; fr. red, edible, solitary. Japan, China; locally in An., Che., Ki., Ku. Thickets.
9. **Rubus canadensis** Linn. Blackberry 大黑刺莓 (Ta Hei Tzŭ Mei; Large-black-thorny-strawberry) (R.M. 420). Shrub, to 2 m.; fls. white; fr. black, usually clustered. Eastern North America; locally in Ku. Cultivated, fruit.
10. **Rubus occidentalis** Linn. Black Raspberry 黑刺莓 (Hei Tzŭ Mei; Black-thorny strawberry) (R.M. 416). Shrub, to 1 m., fr. black. North America; locally in Ku. Cultivated, fruit.
11. **Rubus parvifolius** Linn. 草楊莓子 (Ts'ao Yang Mei Tzŭ; Herbaceous Myrica) (R.M.415). Shrub, to 1 m.; fls. red, IV–V; fr. reddish orange, edible, V–VII. China, Japan; locally in An., Ki., Ku. Brushland.
12. **Rubus phoenicolasius** Maxim. Wineberry 白裡葉木莓 (Pai Li Yeh Mu Mei; Leaf-white-beneath Rubus) (R.M., 415). Shrub, to 3 m.; fls. pink, VI–VII; fr. red. Korea, Japan, China; locally in Ku. Woodland.
13. **Rubus irenaeus** Focke (R.M. 410). Shrub; fl. VII; fr. red. Central and western China; locally in An. Woodland.
14. **Rubus kulinganus** Bailey 牯嶺木莓 (Ku Ling Mu Mei) (B.G. 1:30). Shrub; fr. VIII. China; locally in Che., Ki. Brushland.
15. **Rubus rosaefolius** Sm. 空心薦 (K'ung Hsin Piao; Hollow-stemmed Berry) (R.M. 413). Scandent shrub; fls. white, III–IV; fr. yellow to orange-red, VII. Tropical and warm temperate Asia; locally in Ki. Thickets.
16. **Rubus innominatus** S. Moore (R.M. 416). Shrub, to 3 m.; fls. pink, VII–VIII; fr. orange-red, IX. Southeastern and western China; locally in Ki. Woodland.
17. **Rubus coreanus** Miq. 覆盆子 (Fu P'ên Tzŭ; Inverted Basin) (R.M. 415). Shrub, to 3 m.; fls. pink, V–VI; fr. red or black, VI–VII. Korea, Japan, China; locally in Che., Ki. Forest shade.

Rubus swinhoei Hance (R.M. 1st. 411) grows on Chu Hwa Shan, Anhwei (R.C. Ching 2679 & 2763). It has simple ovate leaves; and the calyx and pedicels are glandular-prickly.

13. **Geum** Linn. Avens 水楊梅屬 (Shui Yang Mei Shu; Water Myrica Genus)

Perennial *herbs with* pinnately compound or *lyrate lvs.*: fls. solitary or clustered, 5-parted, yellow, white or red; calyx tube bell-shaped or flattened, the lobes usually with alternating bractlets: receptacle conical or cylindrical, bearing many *achenes with long persistent styles.* Over 50 species, in temperate and cold regions; one in China. (An old Latin name.)

1. **Geum aleppicum** Jacq. (*G. strictum* F. & H., not Ait.) 蛇蔄大草 (Shê Chieh Ta Ts'ao; Snake-jointed Great Herb) (G.M. 817). Herb, to 1 m.; fls. yellow, VII; fr. VIII–IX. Eurasia, North America; locally in An., Che., Ki. Meadow and brushland.

14. **Rosa** Linn. Rose 薔薇屬 (Ch'iang Wei Shu)

Erect or climbing *shrubs*, usually *with prickly stems*: *lvs.* pinnately *compound*, with stipules joined to the petiole: fls. solitary or in clusters, white, pink, or red, up to 8 cm. in diam.; calyx lobes and petals usually 5; stamens and pistils numerous: *receptacle urn-shaped*, forming at maturity a somewhat fleshy *hip* which *encloses several to many achenes.* Over 100 species, in temperate and subtropical regions, especially in the northern hemisphere; over 50 species in China. (The Latin name.)

Key to the Species

a. Styles much exserted beyond the mouth of the receptacle: stipules adnate to the petiole.
  b. Styles united into a column, usually as long as the stamens; fls. white.
    c. Lfts. usually 3, lanceolate; stipules irregularly dentate .... 1. *R. triphylla*
    cc. Lfts. 5–9.
      d. Stipules pectinate: prickles usually infrastipular: styles glabrous ..... 2. *R. multiflora* var. *cathayensis*
      dd. Stipules entire or denticulate: prickles scattered.
        Lfts. acute or acuminate, 3–10 cm. long: stems often vining.
          Prickles straight or slightly curved: lfts. green beneath ..... 3. *R. moschata*
          Prickles hooked: lfts. glaucescent beneath ..... 4. *R. henryi*
        Lfts. obtuse or slightly acute, 1–2.5 cm. long: an upright shrub ..... 5. *R. souliana*
  bb. Styles free, about half as long as the stamens: lfts. usually 3–5: fls. red or pink..... 6. *R. chinensis*
aa. Styles not or only slightly exserted, forming a head closing the mouth of the receptacle.
  e. Stipules free or adnate at the base: fls. white or yellow: stems climbing.
    Pedicels and receptacle smooth: stipules subulate: fls. clustered, 2–4 cm. across.
      Fls. in umbels ..... 7. *R. banksiae*
      Fls. in corymbs ..... 8. *R. cymosa*
    Pedicels and receptacle bristly: stipules denticulate: fls. solitary, large ..... 9. *R. laevigata*
  ee. Stipules adnate: fls. purple: an upright shrub ..... 10. *R. rugosa*

1. **Rosa triphylla** Roxb. 銀粉薔薇 (Yin Fên Ch'iang Wei; Silver-powder Rose) (R.M.

446). Climbing shrub; fls. white. Eastern China; locally in Ku. Planted, ornamental.

2. **Rosa multiflora** Thunb. var. **cathayensis** (Bailey) Rehd. & Wils. 野薔薇 (Yeh Ch'iang Wei; Wild Rose) (R.M. 445). Shrub, fls. pink, VI–VII. China; locally in An., Che., Hon., Hup., Ki., Ku. Brushland.
3. **Rosa moschata** Hermm. Musk Rose 黃麗春花 (Huang Li Ch'un Hua; Yellow Poppy) (R.M. 446). Scandent shrub; fls. white, VI; fr. VIII. Eurasia, North Africa; locally in An. Brushland.
4. **Rosa henryi** Boulenger 秀薔薇 (Hsiu Ch'ang Wei; Beautiful Rose) (R.M. 447) Scandent shrub, to 4 m.; fls. white, fragment, VI–VII; fr. dark red, VIII–IX. Central China; locally in An., Ki. Thickets.
5. **Rosa souliana** Crép. (R.M. 447). Erect shrub, to 4 m.; fls. white, VI; fr. orange red, VII. China; locally in An. Brushland.
6. **Rosa chinensis** Jacq. China Rose 月季花 (Yüeh Chi Hua; Monthly Flower) (R.M. 449). Bush; fls. red, pink, white, VI–IX. China; locally in Ki., Ku. Many cultivated varieties.
7. **Rosa banksiae** R. Br. Banks' Rose 木香花 (Mu Hsiang Hua; Fragrant-tree Flower) (R.M. 450). Scandent shrub, to 6 m.; fls. white or yellow, V–VIII, in umbels. China, Japan; locally in Che., Ku. Thickets, cultivated, ornamental.
8. **Rosa cymosa** Tratt. (*R. microcarpa* Lindl.) 小果薔薇 (Hsiao Kuo Ch'iang Wei; Small-fruited Rose) (R.M. 450). Rambling shrub; fls. white, in corymbs. China; locally in An., Che., Ki., Ku. Brushland.
9. **Rosa laevigata** Michx. Cherokee Rose 金櫻子 (Chin Ying Tzŭ; Golden Cherry) (R.M. 450). Scandent shrub, to 5 m.; fls. white, IV–V; fr. VI–VIIII, spiny. China; locally in An., Che., Ki. Thickets. Introduced and widely naturalized in southeastern North America before 1800.
10. **Rosa rugosa** Thunb. 玫瑰花 (Mei Kuei Hua; Jasper Flower) (R.M. 438). Erect shrub, to 2 m.; fls. purple to white, V–VIII; fr. brick red, smooth. China, Korea, Japan; locally in Ku. Planted, ornamental.

IV. **Pomoideae** Pear Subfamily 梨亞科 (Li Ya K'o)

Trees and shrubs: receptacle joined to the ovary, or sometimes prolonged beyond it into a hypanthium: carpels inferior, sometimes bony, usually 5: *fr. a pome.*

15. **Cotoneaster** Medic. Star Quince 鋪地蜈蚣屬 (P'u Ti Wu Kung Shu; Spreading-on-the-ground Centipede Genus)

Shrubs with small coriaceous *simple entire lvs.*, often evergreen: fls. small, white or pink, usually clustered; ovary inferior, with 2–5 bony *2-seeded carpels, becoming* at maturity *a* small red or black *drupaceous pome.* 40 or more species, the majority of them occurring in China. (A Latin name or Greek origin from *kotoneon*, quince; and *aster*, similar, referring to the quince-like lvs. of some species.)

1. **Cotoneaster hupehensis** Rehd. & Wils. 湖北栒子 (Hu Pai Hsün Tzŭ) (R.M. 353). Shrub, to 2 m.; fls. V; fr. red, VIII–IX. Central and western China; locally in An. Forest.

16. **Pyracantha** Roem. Firethorn 薜若屬 (Pi Jo Shu)

Evergreen *thorny shrubs with* usually *crenate* or serrate *lvs.*: fls. white, clustered: fr. a red or orange pome with five *2-seeded bony carpels*: similar to *Cotoneaster.* 6 species, in southern Eurasia; 4 in China. (Greek: *pyr*, fire; and *acanthos*, thorn, referring to the bright red fr. and thorny brs.)

1. **Pyracantha crenulata** Roem. 薜若 (Pi Jo) (R.M. 358). Shrub or small tree; fls. V–VI; fr. orange red, IX–X. Himalayas; locally in Ku. Planted, ornamental.

17. **Crataegus** Linn. Hawthorn 山楂属 (Shan Cha Shu)

Mostly deciduous *thorny* shrubs or small trees with serrate or lobed lvs.: fls. white or red, usually clustered: *fr.* a red, yellow or black pome, *with* 1–5 *1-seeded bony carpels.* About 1,000 species, in north temperate regions; 15 in China. (From the Greek term meaning "strength," on account of the hardness of the wood.)

Key to the Species

a. Lvs. deeply 5–9-lobed, truncate or broad-cuneate at base; veins extending to sinuses as well as to points of the lobes: thorns often wanting ..... 1. *C. pinnatifida*

aa. Lvs. 3–4-lobed, narrowly cuneate at base; veins extending only to points of lobes or teeth.

Thorns 1–1.5 cm. long: stipules glandular-serrate: young brs. glabrous.

Stipules deciduous; petioles 3.5–5 cm. long: nutlets 5 ..... 2. *C. hupehensis*

Stipules persistent; petioles 1.5–2 cm. long: nutlets 3 ..... 3. *C. kulingensis*

Thorns less than 1 cm. long: stipules not glandular-serrate: young brs. pubescent: nutlets 5 ..... 4. *C. cuneata*

1. **Crataegus pinnatifida** Bunge 山楂 (Shan Cha) (R.M. 372). Tree, to 6 m.; fls. V–VI; fr. red, IX. Northeastern Asia; locally in An. Planted for fruit.
2. **Crataegus hupehensis** Sarg. 猴楂子 (Hou Cha Tzŭ; Monkey Hawthorn) (Pl.W. 1: 178). Tree, to 5 m.; fr. red, X. China; locally in Ku. Planted, ornamental.
3. **Crataegus kulingensis** Sarg. (Pl. W. 1:179). Shrub or tree, to 7 m.; fr. red. China; locally in Ki. Forest.
4. **Crataegus cuneata** Sieb. & Zucc. 野山楂 (Yeh Shan Cha; Wild Hawthorn) (R.M. 365). Shrub, 1–3 m. high; fls. white, V; fr. red, IX–X. Japan, China; locally in An., Ku. Brushland. Fig. 158.

18. **Cydonia** Mill. Quince 温柈属 (Wên Po Shu)

A deciduous *thornless* tree or shrub with simple *entire lvs.*: *fls. appearing with the lvs.*, 5-parted, white or pink, up to 5 cm. across; *styles distinct*: fr. a fragrant villose pear-shaped pome with 5 leathery or *papery carpels, each* carpel *several-seeded.* One species, in central and eastern Eurasia. (From "Cydon," an old name for Crete.)

1. **Cydonia oblonga** Mill. 温柈 (Wên Po) (R.M. 400). Shrub or tree, to 8 m.; fls. V; fr. yellow, X. Central Asia; locally in Ku. Cultivated, fruit. Fig. 159.

19. **Chaenomeles** Lindl. 木瓜属 (Mu Kua Shu)

Thorny shrubs or small trees with simple *crenate or serrate lvs.*: *fls. appearing with the lvs.*, 5-parted, pink or red; *styles united at the base*: fr. a large pome; the *leathery carpels many-seeded.* 3 species, in eastern Asia; 2 in China. (Greek *chainein,* to split; and *meles,* apple. Thunberg thought the fr. split into 5 valves.)

Key to the Species

Fls. 2–6; calyx colored; lobes upright, entire: plant thorny..... 1. *C. lagenaria*

Fls. solitary; calyx not colored; lobes reflexed, serrulate: plant not thorny. 2. *C. sinensis*

1. **Chaenomeles lagenaria** Koidz. Japanese Quince 貼梗海棠 (T'ieh Kên Hai T'ang; Stuck-on-the-stem Crabapple) (R.M. 399). Shrub, to 2 m.; fls. red, pink or white, clustered, III–IV; fr. yellowish green, X. China; locally in Che., Ku. Cultivated, ornamental. Fig. 160.
2. **Chaenomeles sinensis** (Thouin) Koehne Chinese Quince 木瓜 (Mu Kua; Woody Gourd) (R.M. 400). Tree, to 4 m.; fls. pink, solitary, IV–V; fr. dark yellow, X. China; locally in An., Ku. Cultivated, ornamental, fruit.

20. **Eriobotrya** Lindl. Loquat 枇杷属 (P'i P'a Shu)

Evergreen shrubs and small trees with large simple strongly veined lvs. up to 3 dm. long: fls. white, in wooly terminal panicles; stamens about 20: fr. a fleshy pome; *carpels joined together*, with thin endocarp; *seeds* one to few, *large* and slippery. 10 species, in eastern Asia; 7 in China. (Greek: *erion*, wool; and *botrys*, cluster; referring to the wooly infl.)

1. **Eriobotrya japonica** Lindl. Loquat 枇杷 (P'i P'a) (R.M. 385). Evergreen tree, to 5 m.; fls. cream-colored, X–XII; fr. yellow, IV–VI. Central China; locally in An., Che., Hup., Ki., Ku. Cultivated, fruit. Fig. 161.

21. **Photinia** Lindl. 石楠属 (Shih Nan Shu)

Shrubs or trees with simple usually finely serrate shining lvs.; *fls.* small, usually white, *in compound*, often flat-topped, *clusters*; stamens about 20: styles 2; fr. a small red pome, *open at the top*; *carpels* more or less *free* at the tips; seeds 1–4. 30 species, mostly of eastern Asia; 27 in China. (Greek: *photeinos*, shining, referring to the glossy lvs.)

Key to the Species

a. Lvs. deciduous: infl. with warty axes.
  Infl. corymbose.
    Lvs. villose beneath: fls. and young brts. pubescent: petioles 1–5 mm. long ..... 1. *P. villosa*
    Lvs., fls. and young brts. glabrous: petioles 5–10 mm. long .. 2. *P. beauverdiana*
  Infl. subumbellate, glabrous ..... 3. *P. parvifolia*
aa. Lvs. evergreen: axes of the infl. not warty.
  Winter buds 3–4 mm. in diam.: petioles 2–4 cm. long: fls. 6–7 mm. in diam.; petals not bearded ..... 4. *P. serrulata*
  Winter buds 1–2 mm. in diam.: petioles 1–1.5 cm. long.
    Lvs. pubescent on veins beneath: fls. 1 cm. across: fr. 7–10 mm. long..... 5. *P. davidsoniae*
    Lvs. glabrous on both sides: fls. 6–7 mm. across; petals bearded: fr. 5–6 mm. long ..... 6. *P. glabra*

1. **Photinia villosa** DC. 毛葉石楠 (Mao Yeh Shih Nan) (R.M. 384). Tree, to 10 m.; fls. white, V–VI; fr. red, X. Japan, Korea, China; locally in An., Che., Ki., Ku. Forest.
2. **Photinia beauverdiana** Schneid. (R.M. 384). Tree, to 6 m.; fls. white, V; fr. scarlet. Central and western China; locally in An., Che., Hup., Ki., Ku. Forest.
3. **Photinia parvifolia** (Pritz.) Schneid. 山石楠 (Shan Shih Nan; Mountain Photinia) (R.M. 384). Shrub, to 2 m.; fls. V–VI; fr. scarlet, X. Eastern and central China; locally in Ku. Woodland.

4. **Photinia serrulata** Lindl. 石楠 (Shih Nan; Rock Machilus) (R.M. 384). Tree, 5–10 m. high; fls. white, V–VII; fr. red, small, X. China; locally in An., Che., Ku. Grave land. Fig. 162.
5. **Photinia davidsoniae** Rehd. & Wils. 檵木 (Lo Mu) (R.M. 385). Tree, to 8 m.; fls. white, V; fr. red, larger, X. Central China; locally in An., Che., Ku. Forest.
6. **Photinia glabra** (Thunb.) Maxim. (R.M. 385). Shrub, to 3 m.; fls. white, V; fr. red, X. Japan and China; locally in Che., Ki. Forest.

22. **Sorbus** Linn. Mountain Ash 花楸樹属 (Hua Ch'iu Shu Shu; Flowering Catalpa Genus)

Deciduous small trees or shrubs with simple (ours) or pinnately compound lvs.: *fls.* white or pink, *in compound clusters*: *fr.* a small berry-like pome, *closed at the top*; *carpels* cartilaginous, *more or less free*, each with 1–2 seeds. 80–100 species, in the northern hemisphere; about 40 in China. (An old Latin name.)

Key to the Species

Lvs. glabrous beneath, or with a few hairs along the veins.
Veins not conspicuously depressed above: styles usually 2. ..... 1. *S. alnifolia*
Veins conspicuously depressed above: styles 5 ..... 2. *S. caloneura*
Lvs. white-tomentose beneath ..... 3. *S. folgneri*

1. **Sorbus alnifolia** (S. & Z.) K. Koch 水榆 (Shui Yü; Water Elm) (R.M. 380). Tree, to 20 m.; fls. V; fr. red or yellow, IX–X; lvs. unequally serrate. Central China, Korea, Japan; locally in An., Ki. Forest. Fig. 163.
2. **Sorbus caloneura** (Stapf) Rehd. (R.M. 381). Shrub or tree, to 6 m.; fr. brown, IX. Central China; locally in Ki. Forest.
3. **Sorbus folgneri** (Schneid.) Rehd. 石灰樹 (Shih Hui Shu; Lime Tree) (R.M. 381). Tree, 6–12 m. high; fls. V; fr. red, X. Central China; locally in An., Ki. Forest.

23. **Malus** Mill. Apple 蘋果属 (P'in Kuo Shu)

Deciduous trees or shrubs with simple serrate or lobed lvs.: *fls. in* umbel-like *racemes*, white, pink or red; *styles united at the base*: *fr.* an *apple-shaped* pome, with few grit cells or none. About 25 species, in north temperate regions; 10–15 in China. (From the Latin name for "apple".)

Key to the Species

a. Calyx deciduous in fr.
Calyx-lobes narrow-lanceolate, longer than the tube, brownish: petioles and veins of the lvs. pubescent: styles 5, rarely 4; fls. white ..... 1. *M. baccata*
Calyx lobes triangular-ovate, shorter than the tube or as long, purple: lvs. glabrous or nearly so.
Styles 3, rarely 4; calyx lobes acute or acuminate: young brts. grayish or brownish: fr. globose: fls. white or pinkish.... 2. *M. hupehensis*
Styles 4 or 5; calyx lobes obtusish: young brts. purple: fr. pyriform: fls. bright rose ..... 3. *M. halliana*
aa. Calyx persistent in fr.

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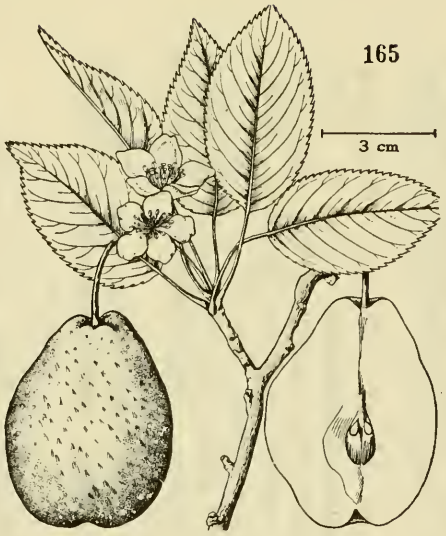

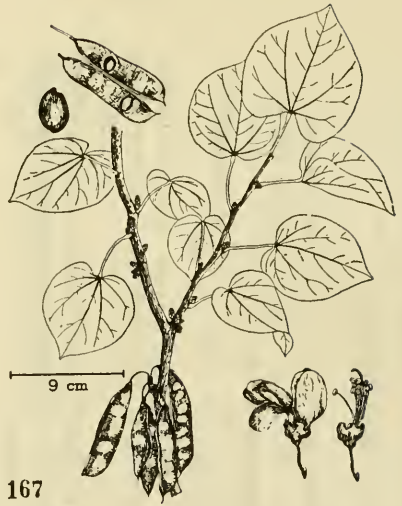

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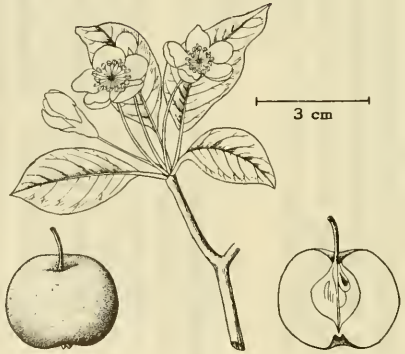

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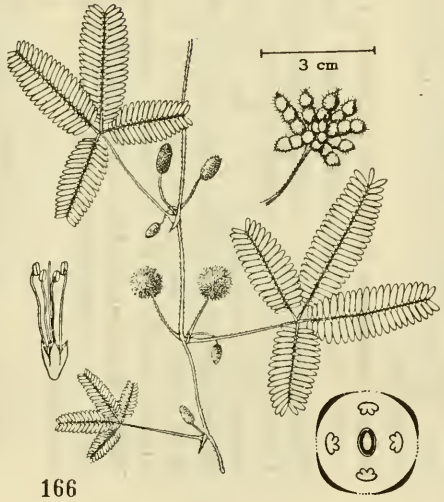

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163. Sorbus alnifolia
164. Malus pumila

165. Pyrus serrulata
166. Mimosa pudica

167. Cercis chinensis
168. Gleditsia sinensis

b. Fls. with a tubular constricted disk enclosing the connate base of the styles: young brts. and lvs. glabrous: calyx impressed: fr. large ..... 4. *M. formosana*

bb. Fls. without a tubular constricted disk: young brts. and lvs. more or less pubescent.

Calyx lobes longer than the tube, acuminate: fr. large, 4 cm. or more across.

Calyx deeply impressed in fr.: lvs. crenate-serrate. ..... 5. *M. pumila*

Calyx raised in fr.: lvs. sharply serrate ..... 6. *M. prunifolia*

Calyx lobes as long as the tube, acute, impressed in fr.: fr. smaller, 1–1.5 cm. across..... 7. *M. micromalus*

1. **Malus baccata** (L.) Borkh. Siberian Crab 山荊子 (Shan Ching Tzŭ; Mountain Bramble) (R.M. 392). Tree, to 14 m.; fls. white; fr. red or yellow. Northeastern Asia; locally in Ki. Forest.
2. **Malus hupehensis** (Pamp.) Rehd. 野海棠 (Yeh Hai T'ang; Wild Crabapple) (R.M. 393). Tree, 4–8 m. high; fls. pink or white, IV; fr. yellow, tinged red, globose. China, Himalaya; locally in An., Ki., Ku. Forest.
3. **Malus halliana** Koehne 垂絲海棠 (Ch'ui Ssŭ Hai T'ang; Drooping-silk Crab) (R.M. 393). Tree, to 5 m.; fls. pink; fr. purplish. Japan, China; locally in Ku. Planted, ornamental.
4. **Malus formosana** Kawakami Formosa Crab 台湾林檎 (T'ai Wan Lin Ch'in) (Pl.W. 2:279). Tree, 4–7 m. high; fr. large. Formosa, China; locally in An., Ki. Forest.
5. **Malus pumila** Mill. Common Apple 西洋蘋果 (Hsi Yang P'ing Kuo) (R.M. 391). Tree, to 15 m.; fls. white or pinkish; fr. edible, large lvs. pubescent. Europe, western Asia; locally in An., Ku. Cultivated, fruit. Fig. 164.
6. **Malus prunifolia** (Willd.) Borkh. var **rinki** Rehd. 花紅 (Hua Hung; Red Flower) (R.M. 392). Small tree; fls. white or pinkish. Northeastern Asia, native to Hupeh; locally in Ku. Planted, ornamental.
7. **Malus micromalus** Mak. 西府海棠 (Hsi Fu Hai T'ang; Western-palace Crabapple) (R.M. 392). Small tree; fls. pink; fr. red, small. Japan; locally in Ku. Planted, ornamental.

24. **Pyrus** Linn. Pear 梨属 (Li Shu)

Deciduous trees or shrubs, sometimes thorny, with simple lvs.: *fls. in* umbel-like *racemes*, white or pink; *styles distinct*: *fr.* usually a *pear-shaped* pome, *with numerous grit cells*. About 20 species, in Eurasia and North Africa; 10–15 in China. (The Latin name, spelled "Pirus" in classical literature.)

Key to the Species

a. Calyx persistent in fruit ..... 1. *P. lindleyi*

aa. Calyx deciduous.

b. Lvs. serrate, with pointed teeth.

Serrations of the lvs. with sharply acuminate or setose teeth.

Fls. small, 1.5–2 cm. across: fr. 1–1.5 cm. in diam..... 2. *P. betulaefolia*

Fls. large, 3–3.5 cm. across: fr. about 3 cm. in diam. ..... 3. *P. pyrifolia*

Serrations of the lvs. with acute, but not acuminate teeth ..... 4. *P. serrulata*

bb. Lvs. crenate, with rounded teeth ..... 5. *P. calleryana*

1. **Pyrus lindleyi** Rehd. 嶺南梨 (Ling Nan Li; South China Pear) (R.M. 404). Tree; fls. IV. China; locally in Ku. Wooded ravines.

2. **Pyrus betulaefolia** Bunge 棠梨 (T'ang Li; Small-fruited Pear) (R.M. 405). Tree, to 10 m.; fls. white, small, IV; fr. brown, small. Northern China; locally in An., Ku. Woodland.
3. **Pyrus pyrifolia** (Burm.) Nakai 沙梨 (Sha Li; Sand Pear) (R.M. 405). Tree; fls. large, fr. brown. Central and western China; locally in Ki., Ku. Cultivated, fruit.
4. **Pyrus serrulata** Rehd. 麻梨子 (Ma Li Tzŭ; Pock-marked Pear) (R.M. 404). Tree; fls. white, III–IV; fr. brown, subglobose, 1.5–2 cm. long. Central China; locally in Ki. Rocky slopes. Fig. 165.
5. **Pyrus calleryana** Decne. Callery's Pear 豆糖梨 (Tou T'an Li; Sweetbean Pear) (R.M. 405). Shrub or tree, 1–3 m. high; fls. white, IV; fr. brown, X. China; locally in An., Ki., Ku. Brushland.

25. **Amelanchier** Medic. Shadbush 唐棣属 (T'ang Ti Shu)

Deciduous shrubs or trees: *lvs. with nearly straight veins*: fls. white, in terminal racemes; calyx tube campanulate, with 5 short lobes; petals 5: fr. a small berry-like pome, incompletely 4–10-celled, with one seed in each cell. About 25 species, chiefly in North America, a few in Eurasia; 1 in China. (Provençal name of *A. ovalis*.)

1. **Amelanchier asiatica** (S. & Z.) Endl. var. **sinica** Schneid. 唐棣 (T'ang Ti; Wild Plum) (R.M. 388). Tree, to 13 m.; fls. V; fr. a small berry-like pome, IX. China; locally in An., Hup., Ki. Woodland.

81. **LEGUMINOSAE** Bean Family 豆科 (Tou K'o)

Herbs, often vines, shrubs or trees with *alternate stipulate* compound or simple *lvs.*: fls. irregular or regular, mostly perfect; sepals and petals usually 5; stamens usually 10, diadelphous, 9 and 1, monadelphous or distinct; *ovary superior*, 1-celled, *becoming a legume* in fr., sometimes indehiscent: 500 genera with 12,000 species, widely distributed, especially in the tropics; over 80 genera and more than 300 species in China.

Key to the Genera

A. Fls. small and regular, in dense heads or spikes; petals valvate: lfts. oblique I. Mimosoideae.
  Stamens united at the base: pods glabrous and non-septate: trees — 1. *Albizzia*
  Stamens distinct: pods prickly, breaking into 1-seeded joints: herbs — 2. *Mimosa*
AA. Fls. somewhat irregular or clearly papilionaceous; petals imbricate.
  B. Fls. slightly irregular; upper petals enclosed by the others in the bud II. Caesalpinioideae.
    C. Lvs. simple and with entire margins ..... 3. *Cercis*
    CC. Lvs. pinnately compound, or twice pinnate.
      D. Plants armed with thorns or prickles.
        Thorns large and branched: pods flat ..... 4. *Gleditsia*
        Thorns small recurved prickles: pods oblong ..... 5. *Caesalpinia*
      DD. Plants unarmed.
        Pods many-seeded: herbs ..... 6. *Cassia*
        Pods few-seeded: trees ..... 7. *Gymnocladus*
  BB. Fls. definitely papilionaceous; petals valvate III. Papilionoideae.
    E. Stamens distinct.
      F. Lvs. pinnately compound: trees (Sophoreae).
        Pods constricted between the seeds: stamens equal: lfts. membranous: seeds not scarlet ..... 8. *Sophora*
        Pods oblong to linear, 2-valved, not constricted.
          Stamens free, unequal: lfts. coriaceous: seeds

scarlet ..... 9. *Ormosia*
Stamens slightly connate at the base, equal: lfts. membranous: seeds not scarlet ..... 10. *Maackia*
FF. Lvs. simple or trifoliolate: pods flat: herbs (Podularieae) 11. *Thermopsis*
EE. Stamens monadelphous or diadelphous.
G. Pods constricted between the seeds, or of only one fertile joint (Hedysareae).
H. Pods maturing underground, usually 1–3-seeded, somewhat inflated, but constricted between the seeds ..... 12. *Arachis*
HH. Pods maturing above ground, flattened and jointed, or of only one fertile joint.
I. Pods several-jointed.
Leaflets numerous, very small: stamens grouped 5 and 5..... 13. *Aeschynomene*
Leaflets few or only one: stamens monadelphous or grouped 9 and 1..... 14. *Desmodium*
II. Pods reduced to a single joint.
Pedicels solitary, in the axils of deciduous bracts; keel of the fl. curved-acuminate 15. *Campylotropis*
Pedicels often 2–4 together, subtended by persistent bracts; keel of the fl. erect, obtuse or truncate, or the fls. apetalous: shrubs or herbaceous annuals ..... 16. *Lespedeza*
GG. Pods not constricted or jointed between the seeds.
J. Lvs. pinnately compound, with many lfts.
K. Some of the lfts. replaced with tendrils.
Wing petals united to the keel for more than half their length.
Style enlarged at the top, bearded down one side .... 17. *Pisum*
Style slender, with a tuft of hairs at the top..... 18. *Vicia*
Wing petals free, or nearly so ..... 19. *Lathyrus*
KK. Lvs. without tendrils.
L. Corolla incomplete, only the standard present: pods short, 1-seeded ..... 20. *Amorpha*
LL. Corolla complete: pods elongated, with several seeds.
M. Pods opening by two valves.
N. Woody twining vines ..... 21. *Wisteria*
NN. Herbs, shrubs or trees.
O. Trees or shrubs with spines in pairs at the lf. bases.
Lvs. alternate: fls. white, in pendulous racemes: trees ..... 22. *Robinia*
Lvs. fascicled; rachis persistent, spiny: fls. yellow, solitary or fascicled: shrubs ..... 23. *Caragana*
OO. Unarmed herbs, shrubs or trees.
P. Anthers apiculate, centrally attached: shrubs or shrub-like herbs ..... 24. *Indigofera*
PP. Anthers obtuse, basifixed.
Q. Woody vines: fls. in large panicles 25. *Millettia*
QQ. Herbs: fls. in head-like clusters or racemes.

Lvs. with 1–4 prs. of lfts..... 18. *Vicia*
Lvs. with more than 4 prs. of lfts.
Keels curved, equal to or a little shorter than the wings; stigma small .... 26. *Astragalus*
Keels upright, less than half the length of the standard and wings; stigma broad 27. *Gueldenstaedtia*

MM. Pods indehiscent, flat: trees (Dalbergieae) ..... 28. *Dalbergia*

JJ. Lvs. simple or 3–foliolate.
R. Shrubs, or erect or decumbent herbs, not vines.
S. Lvs. simple or 3–foliolate; margins entire: stamens monadelphous.
T. Shrubs or small trees.
Brs. leafy at anthesis: lvs. trifoliolate: fls. red: pods constricted between the seeds..... 29. *Erythrina*
Brs. nearly leafless: lvs. few, small, simple: fls. yellow: pods compressed ..... 30. *Spartium*
TT. Herbs with simple or digitate lvs.
Pods glabrous, inflated ..... 31. *Crotalaria*
Pods hairy, not inflated ..... 42. *Glycine*
SS. Lvs. 3–foliolate; lfts. serrulate: stamens diadelphous (Trifolieae).
Fls. in head-like clusters: pods membranous, enclosed by the persistent petals ..... 32. *Trifolium*
Fls. in racemes: pods coriaceous, not enclosed by the petals which are usually deciduous.
Pods wrinkled, not coiled ..... 33. *Melilotus*
Pods coiled ..... 34. *Medicago*
RR. Herbaceous vines.
U. Style bearded at or near the top.
Keel of the corolla coiled ..... 35. *Phaseolus*
Keel of the corolla angled or curved, not coiled.
Pods long and slender ..... 36. *Vigna*
Pods short and broad, flattened ..... 37. *Dolichos*
UU. Style beardless on the stigmatic part.
V. Pods rounded or oblong, 1–2–seeded..... 38. *Rhynchosia*
VV. Pods linear or narrowly oblong, several seeded.
W. Calyx 2–lipped, the upper lip much exceeding the lower: pods woody, strongly ribbed on either side near the upper margin ..... 39. *Canavalia*
WW. Calyx 2–lipped or irregularly toothed, the lower teeth more prominent: pods not woody, without ribs.
Lfts. stipellate: fls. densely fascicled, in long racemes: standard auriculate at the base..... 40. *Pueraria*
Lfts. not stipellate: fls. fewer in short racemes: standard not auriculate.
Pods glabrous ..... 41. *Dunbaria*
Pods hairy ..... 42. *Glycine*

I. **Mimosoideae** Mimosa Subfamily 合歡亜科 (Ho Huan Ya K'o)

Trees and shrubs, occasionally herbs, with bipinnate lvs.: lfts. oblique: *fls.* small, *regular*, and borne in dense heads or spikes; *petals valvate*: fr. usually stalked.

1. **Albizzia** Durazz. Mimosa 合歡属 (Ho Huan Shu)

Trees and shrubs with bipinnate lvs.: fls. small, 5-parted, in heads or spikes; *stamens* numerous, united at the base: *pods glabrous, non-septate*, flat and thin. 25 or more species, mostly in the Old World tropics; 10 in China. (After F. degli Albizzi, an Italian nobleman.)

Key to the Species

Lfts. falcate, 6–10 mm. long, acute; midrib close to the upper margin .. 1. *A. julibrissin*
Lfts. oblong, 20–35 mm. long, obtuse; midrib not close to the upper margin ..... 2. *A. kalkora*

1. **Albizzia julibrissin** Durazz. 合歡 (Ho Huan; Happy Union) (R.M. 484). Tree, 5–15 m. high; fls. pink, VI–VII; fr. IX–XI; lfts. small, very many. Persia to Central China; locally in An., Che., Ki., Ku. Planted, ornamental.
2. **Albizzia kalkora** (Roxb.) Prain 山 槐 (Shan Huai; Mountain Pagoda Tree) (R.M. 484). Tree, 5–10 m. high; fls. pink, V–VII; fr. IX–X; lfts. fewer. China to India; locally in An., Che., Ki., Ku. Planted, ornamental.

2. **Mimosa** Linn. 含羞草属 (Han Hsiu Ts'ao Shu)

Herbs (ours), shrubs or trees, sometimes woody vines, often prickly: lvs. bipinnate, often sensitive: fls. small, mostly 4-parted, in dense heads or spikes; *stamens* 4–10, *distinct*: *pods prickly, separating* at maturity *into 1-seeded joints*. About 300 species, mostly of tropical America; 1 cultivated in China. (Greek: *mimos*, actor or mimic, referring to the sensitive lvs. of some species.)

1. **Mimosa pudica** Linn. Sensitive Plant 含羞草 (Han Hsiu Ts'ao; Bashful Plant) (B.M. 589). Spreading shrub; fls. purplish, V–VI; fr. VII–IX; sensitive to touch. Introduced from tropical America; locally in Ku. Cultivated, ornamental. Fig. 166.

II. **Caesalpinioideae** Caesalpinia Subfamily 皂荚亜科 (Tsao Chia Ya K'o)

Trees, shrubs, or rarely herbs: lvs. simple or pinnate: *fls. nearly regular* or appearing somewhat papilionaceous; *petals imbricate*, the upper one inside.

3. **Cercis** Linn. Redbud 紫荆属 (Tzŭ Ching Shu)

Deciduous shrubs or trees with *simple entire palmately nerved lvs.*: fls. before or with the lvs., somewhat papilionaceous; stamens 10, free; pod stalked, flat, narrowly oblong, with several seeds. 9 species, in North America and Eurasia; 5 in China. (Greek: *Kerkis*, the name of the plant.)

1. **Cercis chinensis** Bunge 紫荆 (Tzŭ Ching; Purple Thorn) (R.M. 485). Shrub, 2–3 m. high; fls. red, IV; fr. IX–X. Central China; locally in An., Che., Hon., Ku. Planted, ornamental. Fig. 167.

4. **Gleditsia** Linn. Honey Locust 皂荚属 (Tsao Chia Shu)

Large deciduous trees, the trunk and brs. usually bearing *stout branched spines*:

lvs. pinnate or bipinnate: fls. polygamous, mostly in racemes; calyx lobes and petals 3–5; stamens 6–10, distinct: *pod flat.* 12 species, widely distributed, but not in Australia; 8 in China. (Named for J. G. Gleditsch, Director of the Botanical Garden at Berlin, died 1780.)

Key to the Species

Lvs. with 16–20 lfts., often bipinnate: pod papery or leathery, twisted: spines compressed ..... 1. *G. japonica*
Lvs. with 6–16 lfts., rarely bipinnate: pod woody, not twisted: spines terete.
Pedicels about 10 mm. long: lfts. ovate-oblong ..... 2. *G. macracantha*
Pedicels 3–5 mm. long: lfts. ovate-lanceolate ..... 3. *G. sinensis*

1. **Gleditsia japonica** Miq. (*G. horrida* Mak., not Willd.) 山皂莢 (Shan Tsao Chia; Mountain Gleditsia) (R.M. 486). Tree, to 25 m.; fls. VI–VIII; fr. X–XI; pod twisted and blistered. China, Japan; locally in An., Ku. Planted, seeds, timber.
2. **Gleditsia macracantha** Desf. 刀皂 (Tao Tsao; Knife Soap) (R.M. 486). Tree, to 15 m.; fls. IV–V; fr. IX–X. Central China; locally in Ku. Planted, seeds, timber.
3. **Gleditsia sinensis** Lam. 皂莢 (Tsao Chia; Soap Pod Tree) (R.M. 486). Tree, to 20 m.; fls. V; fr. VIII–X. Eastern China; locally in An., Ku. Woodland. Fig. 168.

5. **Caesalpinia** Linn. 蘇木属 (Su Mu Shu; Haematoxylin Genus)

Shrubs, often prickly climbers (ours *armed with recurved prickles*), or trees with bipinnate lvs.: fls. showy, yellow or red, in axillary racemes; petals 5, nearly equal; stamens 10, curved; anthers versatile: *pod oblong, few-seeded,* inflated (ours) or compressed. 40 species, in all tropical regions; 10 in China. (In honor of A. Caesalpini, Italian botanist, 1519–1603.)

1. **Caesalpinia sepiaria** Roxb. 雲實 (Yün Shih; Cloud Seed) (H.F. 2:256). Woody vine; fls. yellow, IV–V; fr. VIII–X; flg. racemes rigid-erect. Eastern Asia; locally in An., Che., Ku. Brushland.

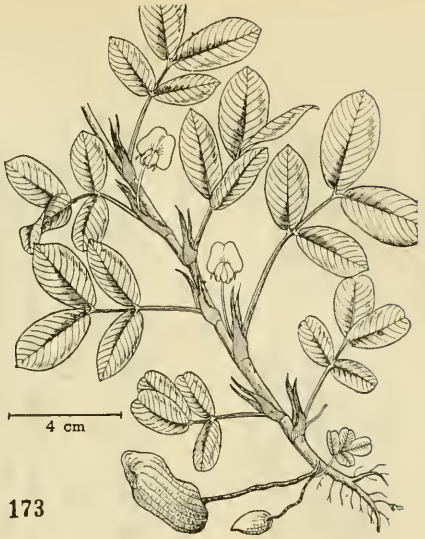
6. **Cassia** Linn. Senna 决明属 (Chüeh Ming Shu; Crystal Genus)

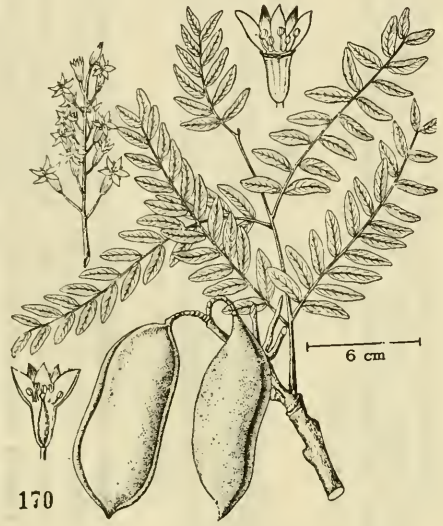
Unarmed herbs (ours), shrubs or trees with pinnate lvs.: fls. nearly regular, mostly yellow; stamens 10, 3–5 often reduced or sterile; anthers opening by 2 apical pores: *pod many-seeded.* 400 species, mostly tropical; 6 in China. (Hebrew: k'siha, the cassia plant.)

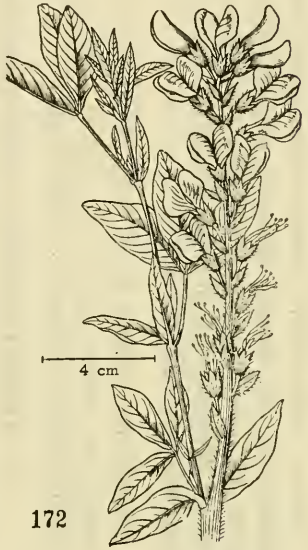
Key to the Species

Lfts. 40 or more, falcate, very small: fls. small: pod flat, 1.5–3.5 cm. long..... 1. *C. mimosoides*
Lfts. 6–10, ovate-oblong, 2.5–7 cm. long: fls. 1.5–2 cm. in diam.: pod cylindric, 10–12 cm. long..... 2. *C. occidentalis*

1. **Cassia mimosoides** Linn. 山扁豆 (Shan Pien Tou; Mountain Flat-bean) (H.F. 2:266). Herb, 1–6 dm. high; fls. yellow, VII–VIII; fr. IX. Introduced from tropical countries; locally in An. Roadside and field weed. Fig. 169.
2. **Cassia occidentalis** Linn. 羊角豆 (Yang-ko Tou; Ram's Horn Bean) (G.M. 886). Erect herb, to 1.5 m.; fls. yellow, VI–VIII; fr. IX. Introduced from tropical America; locally in Ku. Cultivated, ornamental.







169. Cassia mimosoides
170. Gymnocladus chinensis

171. Sophora japonica
172. Thermopsis chinensis

173. Arachis hypogaea
174. Aeschynomene indica

7. **Gymnocladus** Lam. 肥皂荚属 (Fei Tsao Chia Shu)

Unarmed deciduous *trees* with stout almost naked brs. and bipinnate lvs.: fls. nearly regular, in terminal clusters, dioecious or polygamous; petals 5; stamens 10, distinct: pod broad-oblong, somewhat flattened, pulpy within between the *few large seeds*. 2 species, 1 in eastern North America and 1 in China. (Greek: *gymnos*, naked; and *klados*, branch; referring to the stout brs. which are nearly without twigs.)

1. **Gymnocladus chinensis** Baill. 肥皂荚 (Fei Tsao Chia; Fat Gleditsia Pod) (R.M. 487). Tree, to 20 m.; fls. lavender, IV; fr. VIII–X. China; locally in An., Che., Ku. Woodland. Fig. 170.

III. **Papilionoideae** Bean Subfamily 蝶花亚科 (T'ieh Hua Ya K'o)

Trees, shrubs or herbs with digitate or pinnate lvs.: *fls.* nearly always *papilionaceous* (bilaterally symmetrical); *petals imbricate, the upper one* (the standard) *outside.*

8. **Sophora** Linn. 槐樹属 (Huai Shu Shu)

Deciduous woody plants, or sometimes herbaceous, with pinnate lvs.; *lfts. membranous*: fls. in racemes or panicles; calyx with 5 short teeth; *stamens equal*, distinct or *united at the base*: *pods constricted between the seeds.* About 25 species, in Asia and North America; 12 in China. (From *Sophera*, the Arabian name for a tree with pea-shaped flowers.)

Key to the Species

Plant shrubby or subherbaceous when young: lfts. not apiculate: fls. in racemes: pods constricted but not moniliform ..... 1. *S. flavescens*
A tree: lfts. apiculate: fls. in panicles: pods moniliform ..... 2. *S. japonica*

1. **Sophora flavescens** Ait. 苦参 (K'u Shên; Bitter Ginseng) (DC.P. 2:96). Suffrutescent, to 1 m.; fls. white, in racemes, VI; fr. VII–VIII. Eastern Asia; locally in An., Che., Ku. Grassland.
2. **Sophora japonica** Linn. Pagoda Tree 槐樹 (Huai Shu) (R.M. 489). Tree, to 20 m.; fls. white, in panicles, VI–VII; fr. X. China, Japan; locally in An., Che., Ki., Ku. Woodland and planted, ornamental. Fig. 171.

9. **Ormosia** Jacks. Necklace Tree 紅豆樹属 (Hung Tou Shu Shu; Red-bean Tree Genus)

Trees with *coriaceous* pinnate *lvs.*: fls. white, lilac or black-purple, in large clusters; calyx 2-lobed; *stamens free, unequal*: *pod* flattened, *not constricted between the bright red seeds.* 40 species, in tropical regions; 10 in China. (From the Greek term meaning "necklace".)

1. **Ormosia taiana** Chiao Tai's Red Bean Tree 江陰紅豆樹 (Chiang Yin Hung Tou Shu) (Si. 3:349). Tree, to 10 m.; fr. VIII. China; locally in Ku. Planted, ornamental.

10. **Maackia** Rupr. and Maxim. 高麗槐属 (Kao Li Huai Shu; Korean Pagoda-tree Genus)

Deciduous trees or shrubs with *membranous* pinnate *lvs.* and white fls. in dense erect racemes: *stamens* 10, *equal, more or less united*: pods compressed, 1–5-seeded. 6 species, in eastern Asia; 3 in China. (Named after Richard Maack, Russian naturalist, 1825–1886.)

Key to the Species

Small shrub; leaflets 3–7	1.	*M. tenuifolia*
Tree: leaflets 7–17	2.	*M. chinensis*

1. **Maackia tenuifolia** (Hemsl.) Hand.-Mazz. (*M. honanensis* Bailey) 光葉馬鞍樹 (Kuang Yeh Ma An Shu; Naked-leaf Horse-saddle Tree) (B.G. 1:32; H.-M. 7:544). Shrub, to 1 m.; fls. white, IV–V; fr. VII–VIII. China; locally in Ku. Forest.
2. **Maackia chinensis** Takeda (Chen 527). Tree, 6–15 m. high; fls. VII–VIII; fr. X. China; locally in An., Ki. Woodland.

11. **Thermopsis** R. Br. 野決明屬 (Yeh Chüeh Ming Shu)

Perennial *herbs* with *3-foliolate lvs.* and foliaceous stipules: fls. yellow (ours) or purple, conspicuous, in terminal racemes; stamens 10, separate, incurved: *pods flat.* About 20 species, in North America and northeastern Asia; 2 in China. (Greek: *thermos*, the lupine, and *opsis*, appearance.)

1. **Thermopsis chinensis** Benth. 野決明 (Yeh Chüeh Ming; Wild Cassia) (J.B. 1878: 131). Herb, to 6 dm.; fls. yellow, III–IV; fr. V–VI; stipules lanceolate. China; locally in Che., Ku. Grassland. Fig. 172.

12. **Arachis** Linn. 落花生屬 (Lo Hua Shêng Shu)

Low, usually *prostrate herbs*, with pinnate lvs.: fls. solitary or few and axillary, yellow; *stamens* usually *diadelphous, 9 and 1*: *pod oblong-cylindric*, reticulate, *1–3-seeded, constricted between the seeds, maturing underground.* 7 or more species, all of tropical America, but 1 cultivated in all warm countries. (An old Greek name for some leguminous plant.)

1. **Arachis hypogaea** Linn. Peanut 落花生 (Lo Hua Shêng; Born-after-the-flower-drops.) (B.M. 554). Prostrate herb; fls. yellow, VII–VIII; fr. VIII–IX. Introduced from tropical America; locally in An., Ki., Ku. Cultivated, fruit. Fig. 173.

13. **Aeschynomene** Linn. Sensitive Joint Vetch 合萌屬 (Ho Mêng Shu)

Erect herbs with pinnate lvs.: *lfts.* numerous, small, linear, *sensitive*: fls. small, not numerous; *stamens diadelphous, 5 and 5*: *pods* linear; *breaking* up at maturity into *1-seeded joints.* About 30 species, in tropical countries; 1 in China. (From the Greek meaning "being ashamed", because of the sensitive lfts.)

1. **Aeschynomene indica** Linn. 合萌 (Ho Mêng; Bursting-forth Sprouts) (M.F. 237). Erect annual, to 6 dm.; fls. yellow, VII–VIII; fr. VIII–X. Old World tropics; locally in An., Hup., Ki., Ku. Wet open places. Fig. 174.

14. **Desmodium** Desv. Tick Trefoil 山蚟豆屬 (Shan Lu Tou Shu)

Perennial herbs, sometimes woody at the base: *lvs.* usually *3-foliolate*: fls. small; *stamens monadelphous or grouped 9 and 1*; ovary stipitate, often long-stalked in fr.: *loments* flat, deeply lobed on one side and *separating* at maturity *into 1-seeded joints*; joints mostly *covered by* minute *hooked hairs* by which they stick to moving objects and are carried from place to place. 170 species in tropical regions; 30 in China. (Greek: *desmos*, a chain, on account of the manner in which the joints of the pods are held together.)

Key to the Species

a. Lvs. pinnately 7-foliolate; lfts. lanceolate, slenderly pointed, up to 15 cm. long: fls. about 1 cm. long; 2-segmented, with conspicuous stylar beak ..... 1. *D. oldhami*

aa. Lvs. trifoliolate.

b. Terminal lft. oblong, 3-17 mm. long: fls. 3-5 mm. long, on slender pedicels; calyx lobes acuminate: loment 1-8-jointed, constricted from both margins; joints as broad as long ..... 2. *D. microphyllum*

bb. Terminal lft. lanceolate, ovate or rhomboid, 2.5-8 cm. long.

c. Principal nerves of lfts. not extending to margin of blade: fls. 5-8 mm. long.

Calyx lobes acuminate: loment 5-6-lobed; lobes shallow, oblong, constricted from both anterior and posterior margins ..... 3. *D. caudatum*

Calyx turbinate, lobes shallow and rounded: loment long-stalked, exserted 10-18 mm. from the calyx, 2-4-jointed; segments about 9×4 mm., constricted only from the anterior margin, joined by a narrow extended isthmus ..... 4. *D. laxum*

cc. Principal nerves of lfts. extending to margin of blade.

d. Lfts. chartaceous, light green and glaucous beneath.

Fls. large, 8-10 mm. long; calyx deeply cleft: sections of the loment 5 or 6, constricted from both anterior and posterior margins; lfts. rounded or obtuse at the tip ..... 5. *D. floribundum*

Fls. small, less than 5 mm. long: calyx shallowly cleft: sections of the loment usually 2, constricted only from the anterior margin: lfts. slenderly pointed ..... 6. *D. oxyphyllum*

dd. Lfts. membranaceous, only slightly lighter green beneath, ovate to rhomboid; fls. less than 5 mm. long; calyx turbinate, very shallowly lobed: sections of the loment 2 or 3, constricted only from the anterior margin ..... 7. *D. podocarpum*

1. **Desmodium oldhami** Oliv. (Brit. 7:197). Suffrutescent, to 1.5 m.; fls. yellow, VIII; fr. IX. Japan, Korea, South China; locally in Ki. Open woods.

2. **Desmodium microphyllum** (Thunb.) DC. (*D. parvifolium* DC.) 小葉山蚟豆 (Hsiao Yeh Shan Lu Tou; Small-leaved Mountain-lentil) (Be. F. 84; F.H.E. 1:174). Shrub, to 6 dm.; fls. purple, VII–VIII; fr. VIII–IX. Eastern Asia; locally in An., Ki. Brushland.

3. **Desmodium caudatum** (Thunb.) DC. (*D. laburnifolium* DC.) 小槐花 (Hsiao Huai Hua; Small Sophora-flower) (Mak. F. 419). Shrub, to 6 dm.; fls. greenish white, VII–VIII; fr. X. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Brushland.

4. **Desmodium laxum** DC. (Brit. 7:203). Shrub 0.5–0.7 m. high; fls. white, VII–VIII; fr. VIII–IX. Southeastern Asia; locally in An., Che., Hup., Ki., Ku. Shaded thickets.

5. **Desmodium floribundum** (D. Don) G. Don (R.M. 520). Bush, to 2 m.; fls. rose-purple, VII–VIII, large, 8–10 mm. long; fr. IX. Himalayas, China; locally in Ki. Thickets.

6. **Desmodium oxyphyllum** DC. (*D. racemosum* (Thunb.) DC.) (Brit. 7:214). Shrub, to 1 m.; fls. pink or purple, small, less than 5mm. long, VIII–IX; fr. IX–X. Eastern Asia; locally in An., Che., Ki., Ku. Brushland. Fig. 175.
7. **Desmodium podocarpum** DC. 山豆子 (Shan Tou Tzŭ; Mountain Bean) (Brit. 7:208). Suffrutescent, to 1 m.; fls. pink, VII–VIII; fr. IX. Eastern Asia; locally in An., Che., Ku. Brushland and forest.

15. **Campylotropis** Bunge 弯龍骨属 (Wan Lung Ku Shu)

Deciduous shrubs with 3-foliolate lvs.: *fls.* usually purple, *solitary in the axils of deciduous* (ours) or persistent *bracts*: otherwise like *Lespedeza*. About 40 species, in Asia; 20 in China. (Greek: *kampylos*, curved, and *tropis*, keel; referring to the curved keel of the flower.)

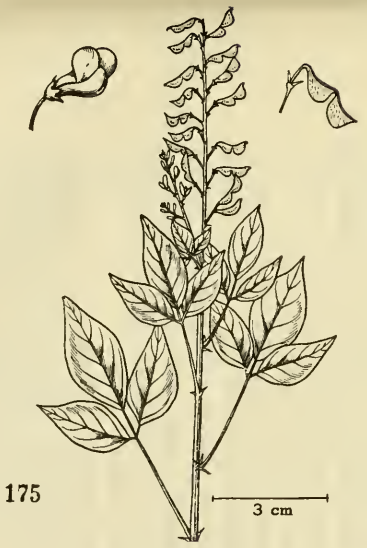
1. **Campylotropis macrocarpa** (Bunge) Rehd. (R.M. 521). Shrub, to 1 m.; fls. pink, VIII–IX; fr. X. Northern and central China; locally in An., Ku. Brushland.

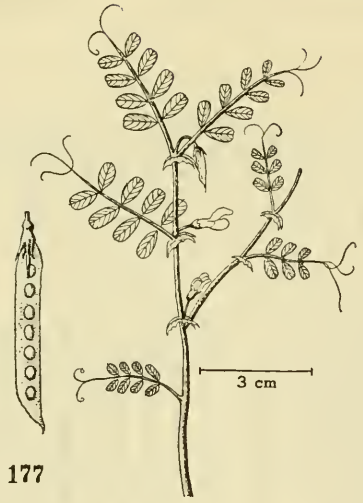
16. **Lespedeza** Michx. Bush Clover 胡枝子属 (Hu Chih Tzŭ Shu)

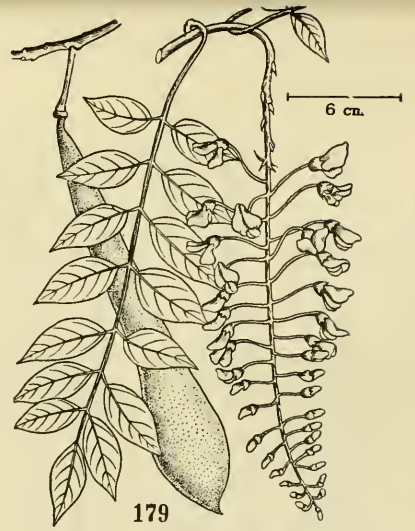
Deciduous shrubs, or herbaceous annuals, with mostly 3-foliolate lvs.: fls. small, but often of 2 kinds, in conspicuous clusters, the apetalous fertile; bracts of the inflorescence *persistent*; pedicels often 2–4 together, bearing 1 or 4 *persistent bracteoles* at the base of the calyx; stamens grouped 9 and 1: *pods 1-seeded*. About 50 species, in North America, Asia and Australia; about 20 in China. (Name misspelled, for Cespedez, a Spanish governor of Florida, who aided Michaux.)

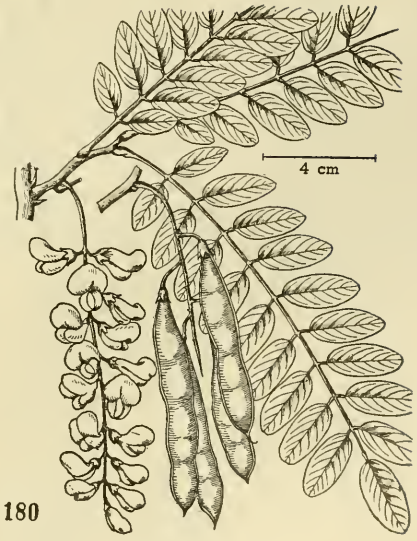
Key to the Species

a. Shrubs, woody at least at the base: pedicels often long and slender, bearing a single bracteole.
  b. Fls. clustered or scattered, but not on long slender peduncles.
    c. Pods at maturity longer than the calyx and not in dense fasciculate clusters: not with stems, lvs. and calyces all spreading-pubescent.
      d. Lfts. cuneate or obovate: plants mostly erect.
        e. Lfts. cuneate: appressed-pubescent or sericeous beneath.
          Lfts. narrowly cuneate: stems stiffly erect and densely lfy.: fls. many, 4-5 mm. long, yellow with purple veins, in small clusters in the axils of many lvs. up and down the stem: pods sometimes not much exceeding the calyx, abruptly mucronate ..... 1. *L. cuneata*
          Lfts. broadly cuneate: stems erect but not densely lfy.: fls. many, 7-10 mm. long, purple, clustered near the tips of the brs.: pods of perfect fls. 3× the calyx ..... 2. *L. floribunda*
        ee. Lfts. obovate to nearly orbicular.
          Stems stout and erect: lfts. oblong-ovate-cuneate, rounded or emarginate at the tip: flg. racemes on peduncles 1-3 cm. long; fls. purple.
            Calyx lobes setaceous: lfts. oblong-cuneate.. 3. *L. dunnii*
            Calyx lobes acuminate but not setaceous: lfts. ovate ..... 4. *L. bicolor*









175. Desmodium oxypyhllum
176. Pisum sativum

177. Vicia sativa
178. Lathyrus odoratus

179. Wisteria sinensis
180. Robinia pseudoacacia

Stems sarmentose; lvs. scattered: flg. peduncles very short (less than 0.5 cm. long); fls. white: calyx lobes and stipules setaceous and striate ..... 5. *L. pilosa*

dd. Lfts. lanceolate, oblong, or ovate.

f. Lfts. ovate- or lanceolate-acuminate and cuspidate, glaucous and appressed-pubescent beneath: calyx-lobes acute but not setaceous.

Fls. yellow marked with purple: bracteoles more than 1/2× the calyx tube: lfts. ovate, 15–50 ×8–30 mm. ..... 6. *L. buergeri*

Fls. purple: bracteoles less than 1/2× the calyx tube: lfts. lanceolate-ovate, 20–65×11–33 mm. 7. *L. maximowiczii*

ff. Lfts. rounded, obtuse or acute, not acuminate.

g. Stems stout, fluted or winged and angled above, very lfy.: fls. reddish-purple, about 10 mm. long: bracteole longer than the calyx tube and setaceous ..... 8. *L. davidii*

gg. Stems slender, cylindric or angular, sometimes striate: bracteole not conspicuously longer than the calyx tube, (except in *L. metcalfii*).

h. Pubescence of the pedicels and calyx grey or whitish.

Calyx lobes setaceous: bracteoles lanceolate or linear.

Fls. 7–8 mm. long, reddish purple; calyx lobes 2× the tube: lfts. green, glabrous above, sparsely appressed-pubescent beneath ..... 9. *L. fordii*

Fls. 11–12 mm. long; calyx lobes 3× the tube: lfts. grey-green, pubescent above and sericeous beneath. 10. *L. metcalfii*

Calyx lobes acute but not setaceous: bracteoles broadly ovate: fls. 12–13 mm. long: lfts. short-appressed-pubescent above, whitish with long appressed hairs beneath..... 11. *L. thunbergii*

hh. Pubescence of the pedicels and calyx yellowish brown or straw-colored: bracteoles ovate to lanceolate: lfts. oblong.

Lfts. elliptic to lanceolate 8–25×4–12 mm., pubescent above, whitish with appressed hairs beneath: calyx lobes narrow and acute, but not setaceous. 12. *L. nipponica*

Lfts. 20–45×10–16 mm., glabrous above, appressed-pubescent beneath: calyx lobes slender and long-setaceous ... 13. *L. paradoxa*

cc. Pods at maturity shorter than the calyx, in dense fasciate clusters: plants erect: stems, lvs. and calyces all spreading-pubescent: fls. white or yellowish ..... 14. *L. tomentosa*

bb. Fls. lilac or white, about 6 mm. long, scattered on long slender peduncles (10–25 mm. long) far exceeding the lvs.: lfts. glabrous above, appressed-pubescent beneath ..... 15. *L. virgata*

aa. Herbaceous annuals: pedicels short, bearing 4 bracteoles at the base of the calyx (Kummerowia).
Lfts. bristly ciliate when young, especially those subtending the infl.: calyx in fr. more than half the length of the pod: pod rounded at apex, with a very short straight or recurved point ..... 16. *L. stipulacea*
Lfts. not conspicuously hairy: calyx in fr. less than half the length of the pod: pod with an acuminate point or beak at the apex ..... 17. *L. striata*

1. **Lespedeza cuneata** (Dum.-Cours.) G. Don (*L. sericea* Miq., not Benth.; *L. juncea*, non Pers.) 鉄掃帚 (T'ieh Sao Chou; Iron Broom) (R.M. 521). Shrub, to 6 dm.; fls. white or yellowish, VII–X. Eastern Asia, Malaysia, Australia; locally in Che., Ku. Grassland.
2. **Lespedeza floribunda** Bunge 多花胡枝子 (To Hua Hu Chih Tzŭ; Many-flowered Bush-clover) (A.H.P. 2:360). Shrub, to 2 m.; fls. purple, VII–IX; fr. X. North China; locally in Ku. Brushland and grassland.
3. **Lespedeza dunnii** Schindl. (Pl.W. 2:111). Shrub; fls. purple, V–VI; fr. VII–VIII. China; locally in An. Thickets.
4. **Lespedeza bicolor** Turcz. 胡枝子 (Hu Chih Tzŭ; Wild Stem) (R.M. 520). Shrub, to 1 m.; fls. purple, VII–IX; fr. X; calyx teeth ovate lanceolate. North China, Manchuria, Japan; locally in An., Ki., Ku. Brushland.
5. **Lespedeza pilosa** (Thunb.) Sieb. & Zucc. 貓荻 (Mao Ti; Cat Reed) (Mak.F. 418). Creeping shrub; fls. white, VII–IX; fr. X. Japan, China; locally in Ku. Brushland.
6. **Lespedeza buergeri** Miq. 木本胡枝子 (Mu Pên Hu Chih Tzŭ; Woody Bush-clover) (R.M. 521). Shrub, to 2 m.; fls. yellow and purple, VI–VIII. China, Japan; locally in An., Che., Ki. Brushland.
7. **Lespedeza maximowiczii** Schneid. (Nak.L. 38). Shrub, to 4 m.; fls. purple, VII–VIII; fr. IX–X. Korea, China; locally in An., Che., Ku. Thickets.
8. **Lespedeza davidii** Franch. (Fra. D. 1:94). Shrub, to 2 m.; fls. purple, VIII; fr. IX–X. China; locally in Ki. Brushland.
9. **Lespedeza fordii** Schindl. (E.J. 49:586). Shrub, to 1 m.; fls. reddish purple, VIII–IX; fr. IX–X. China; locally in An., Che., Ki. Brushland.
10. **Lespedeza metcalfii** Ricker (Am. JB. 33:258). Shrub, to 7 dm.; fls. reddish purple, VI–VII; fr. VII–IX; lfts. elliptic-oblanceolate-mucronate. China; locally in An. Brushland.
11. **Lespedeza thunbergii** (DC.) Nakai 馬掃帚 (Ma Sao Chou; Horse Broom) (R.M. 520). Shrub, to 2 m.; fls. rose-purple, VII–IX; fr. IX–X; calyx cleft 1/3. Japan, Korea, China; locally in An., Che., Ki., Ku. Brushland.
12. **Lespedeza nipponica** Nakai (Nak.L. 10). Shrub, to 3 m.; fls. purple, VIII–IX. fr. IX–X; lfts. often emarginate. Japan, Korea, China; locally in Che., Ku. Brushland.
13. **Lespedeza paradoxa** Ricker (Am. JB. 33:258). Shrub, to 6 dm.; fls. purplish, VIII; fr. X; lfts. mucronate. China; locally in An. Brushland.
14. **Lespedeza tomentosa** (Thunb.) Sieb. apud Maxim. 白荻 (Pai Ti; White Reed) (Mak. F. 418). Shrub, to 1 m.; fls. yellow-white, VIII–IX; fr. X. Eastern Asia; locally in An., Ki., Ku. Grassland.
15. **Lespedeza virgata** (Thunb.) DC. 蒔絵荻 (Shih Hui Ti; A-drawing-brush) (Mak.F. 417). Shrub, to 6 dm.; fls. yellow and purple, VII–IX. Japan and China; locally

in An., Ku. Grassland.

16. **Lespedeza stipulacea** Maxim. (*Kummerowia stipulacea* (Maxim.) Mak.) (G.M. 927). Decumbent annual; fls. pink, VIII; fr. IX; bracteal lvs. bristly-ciliate. Eastern Asia; locally in Ku. Grassland.
17. **Lespedeza striata** (Thunb.) Hook. & Arn. (*Kummerowia striata* (Thunb.) Schindl.) (G.M. 927). Prostrate or decumbent annual; fls. pink, VIII–IX; fr. IX–X; bracteal lvs. glabrous or sparsely pubescent. Eastern Asia; locally in An., Che., Ki., Ku. Grassland.

For a careful description and discussion of the characters of *L. stipulacea* and *L. striata* see article by Duane Isely in Rhodora 50 (590): 21–27, 1950. 2 pls. Bibliog.

17. **Pisum** Linn. Pea 豌豆屬 (Wan Tou Shu)

Herbs, climbing by tendrils modified from the outer lfts. of the pinnate lvs.: *stipules large and lf.-like*: fls. large, white or reddish purple, solitary or in few-fld. racemes; *wing petals* somewhat *united with the keel*; *style enlarged at the top, bearded down one side.* 6 species, in Eurasia; 1 cultivated in China. (The old Greek name.)

1. **Pisum sativum** Linn. Garden and Field Pea 豌豆 (Wan Tou) (B.M. 553). Herbaceous vine; fls. white or dark red, III–V; fr. IV–VI; tendrils branched. Eurasia; locally in An., Che., Ki. Ku. Cultivated, vegetable, fodder. Fig. 176.

18. **Vicia** Linn. Vetch 蠶豆屬 (Ts'an Tou Shu)

Herbs, mostly vines *climbing by tendrils* at the tips of the pinnate lvs., but also including erect, bushy or decumbent species: fls. blue, purple or yellowish; *wing petals united with the keel*; stamens grouped 9 and 1; *style slender, with a tuft of hairs at the top.* About 150 species, widely distributed; 10 or more in China. (The classical Latin name.)

Key to the Species

a. Lvs. without tendrils.
  b. Fls. 2.5–3.5 cm. long, white and brownish purple: pods thick, 5–12 cm. long: stems simple, succulent: plant annual, cultivated ..... 1. *V. faba*
  bb. Fls. 1–1.7 cm. long, purplish blue: pods more or less flattened, 1–3 cm. long: stems branched, not succulent: plants perennial, wild.
    Fls. numerous, in long racemes: margins of lfts. scabrous, with short stiff forward-pointing hairs.
      Lfts. 2 ..... 2. *V. unijuga*
      Lfts. 5–8 ..... 3. *V. venosa*
    Fls. few, in short racemes: margins of lfts. smooth ..... 4. *V. kulingana*
aa. Lvs. tendril-bearing.
  c. Peduncles very short or wanting.
    Annual: calyx teeth about equal to the tube; fls. solitary or in pairs; pods over 4 cm. long ..... 5. *V. sativa*
    Perennial: calyx teeth much shorter than the tube; fls. 3–4, in a subsessile raceme: pods 2–3 cm. long..... 6. *V. sepium*
  cc. Peduncles well developed.
    d. Fls. 2–6: seeds 2–4.
      Fls. less than 1 cm. long.

Peduncle 2-fld.: fls. bluish: pods glabrous, 4-seeded: stipules entire ..... 7. *V. tetrasperma*
Peduncle 3-6-fld.: fls. whitish: pods hairy, 2-seeded: stipules laciniately cleft ..... 8. *V. hirsuta*
Fls. larger, 2 cm. long, bluish ..... 9. *V. tridentata*
dd. Fls. numerous, in a 1-sided raceme: seeds 2-8: plants villous ..... 10. *V. villosa*

1. **Vicia faba** Linn. Broad Bean 蠶豆 (Ts'an Tou; Silkworm Bean) (B.M. 552). Stout herb, to 1 m.; fls. yellow and purple, fragrant, III–V; fr. IV–VI; pods thick. Introduced from northern Africa and southwestern Asia; locally in An., Che., Ki., Ku. Cultivated, vegetable, fodder.
2. **Vicia unijuga** A. Br. 歪頭菜 (Wai T'ou Ts'ai; Oblique-headed Plant) (Mak.F. 413). Erect herb, to 1 m.; fls. purple, VII–VIII; fr. VIII–IX. Eastern Asia; locally in Che., Hup., Ki. Shaded woodland.
3. **Vicia venosa** (Willd.) Maxim. (*Orobus venosus* Willd.) (Le. F. 1:689). Erect herb, to 1 m.; fls. purple, V; fr. VIII. Northeastern Asia; locally in Ku. Woodland.
4. **Vicia kulingana** Bailey (B.G. 1:33). Weak herb, to 1 m.; fls. purple, VII–IX; lfts. 4. China; locally in An., Che., Ki. Woodland.
5. **Vicia sativa** Linn. Spring Vetch 野豌豆 (Yeh Wan Tou; Wild Pea) (B.M. 552). Annual vine; fls. purple, IV; fr. V. Introduced from Europe; locally in An., Ku. Roadside and field weed. Fig. 177.
6. **Vicia sepium** Linn. 伊吹野豌豆 (I Ch'ui Yeh Wan Tou) (G.M. 930). Vine; fls. purple, VI–VII. Introduced from Europe; locally in Ku. Field weed.
7. **Vicia tetrasperma** (L.) Moench 鳥喙豆 (Niao Hai Tou; Bird-pecked Bean) (G.M. 931). Vine; fls. pink or purple, IV; fr. V. Naturalized from Europe; locally in Che., Ku. Grassland.
8. **Vicia hirsuta** (L.) S.F. Gray 小巢菜 (Hsiao Ch'ao Ts'ai; Small Nest-plant) (G.M. 931). Vine; fls. whitish, IV; fr. V. Naturalized from Europe; locally in Che., Ku. Grassland.
9. **Vicia tridentata** Bunge 山黧豆 (Shan Li Tou; Mountain Dark-bean) (Bunge 19). Vine; fls. purple, large, over 2 cm. long, IV. North China; locally in An., Ku. Grassland.
10. **Vicia villosa** Roth Hairy Vetch (G.M. 932). Vine; fls. purple, V. Eurasia; locally in Ku. Roadside and field weed.

19. **Lathyrus** Linn. Vetchling 山黧豆屬 (Shan Li Tou Shu; Mountain Dark-bean Genus)

Herbs, mostly vines with *tendril-bearing pinnate lvs.*: fls. variously colored and showy; *wing petals free* or nearly so; *style* flattened and *bearded on the inner face*. Over 100 species, in the northern hemisphere and South America; 3 or 4 in China. (An old Greek name, used by Theophrastus for some leguminous plant.)

1. **Lathyrus odoratus** Linn. Sweet Pea 麝香豌豆 (Shê Hsiang Wan Tou; Musk-fragrance Pea) (B.M. 551). Vine; fls. variously colored, V–VII; fr. VI–VIII; fragrance pronounced. Introduced from Italy; locally in An., Che., Ku. Cultivated, flowers. Fig. 178.

20. **Amorpha** Linn. False Indigo 紫花槐屬 (Tzŭ Hua Huai Shu)

Deciduous *shrubs*, *glandular-punctate*: lvs. pinnate, without tendrils; fls. small,

white, blue or purple, not papilionaceous; *wings and keel of the corolla wanting*: *pod short*, indehiscent, usually *1-seeded*. 15 species, in North America, 1 cultivated in China. (Greek: *amorphos*, deformed, referring to the incomplete corolla.)

1. **Amorpha fruticosa** Linn. Bastard Indigo 紫花槐 (Tzŭ Hua Huai; Purple-flowered Sophora) (R.M. 505). Shrub, to 3 m.; fls. purple, V–VIII; fr. X; pod curved. Introduced from eastern United States; locally in Ku. Planted, ornamental.

21. **Wisteria** Nutt. 紫藤属 (Tzŭ T'êng Shu)

Woody twining vines with deciduous pinnate lvs.: fls. in long drooping racemes, lilac-purple, blue or white; *corolla complete*: *pods* flat, *dehiscent*, *several-seeded*, sometimes more or less constricted between the seeds. 7 species, in eastern North America and eastern Asia; 2 in China. (For Caspar Wistar, Professor of Anatomy, University of Pennsylvania, 1761–1818.)

1. **Wisteria sinensis** (Sims) Sweet Chinese Wisteria 紫藤 (Tzŭ T'êng; Purple Vine) (R.M. 507). Woody vine; fls. purple or white, IV–V; fr. IX–X; lfts. 7–13. China; locally in An., Che., Ki., Ku. Woodland and planted ornamental. Fig. 179.

22. **Robinia** Linn. Locust 洋槐属 (Yang Huai Shu)

Trees or shrubs with *alternate* pinnate *lvs.*, the *stipules* often *modified as spines*: *fls. white, in pendulous racemes*: pod flat, several-seeded: about 20 species, in North and Central America; 1 planted in China. (For Jean Robin, 1550–1629; and Vespesian Robin, 1579–1600; herbalists to the king of France.)

1. **Robinia pseudoacacia** Linn. Black Locust 洋槐 (Yang Huai; Foreign Pagoda-tree) (R.M. 509). Tree, to 15 m.; fls. white, IV–V; fr. VIII–X. Introduced and naturalized from eastern United States; locally in An., Che., Ki., Ku. Planted, ornamental, woodland; naturalized, waste ground. Fig. 180.

23. **Caragana** Lam. Pea Tree 錦雞兒属 (Chin Chi Êrh Shu)

Deciduous shrubs: *lvs. fascicled*, pinnate, the *tip of the rachis and the stipules often spiny*: fls. solitary or fascicled, usually yellow: pod linear, terete, several-seeded. About 50 species, in central, northern and eastern Asia; 40 in China. (From *Caragan*, the Mongolian name of the plant.)

1. **Caragana chamlagu** Lam. 錦雞兒 (Chin Chi Êrh; Golden Pheasant) (R.M. 516). Spiny shrub, to 2 m.; fls. yellow, IV–V; fr. V–VI. China; locally in Ki., Ku. Woodland.

24. **Indigofera** Linn. Indigo 木藍属 (Mu Lan Shu; Woody-indigo Genus)

Shrubs and perennial herbs, often pubescent with hairs attached at the middle: lvs. usually pinnate: fls. in spikes or racemes, pink or purple; *anthers apiculate, centrally attached*: pod usually cylindrical, often curved. About 300 species, in the warm countries of the world; 50 in China. (Latin terms meaning "indigo-bearing." Some species yield indigo.)

Key to the Species

a. Fls. 1 cm. or more long.

b. Young stems glabrous or appressed pubescent.
c. Corolla pubescent in the bud.
Lfts. more or less pubescent.
Pods pubescent ..... 1. *I. chenii*
Pods glabrous ..... 2. *I. carlesii*
Lfts. mostly glabrous ..... 3. *I. fortunei*
cc. Corolla glabrous in the bud ..... 4. *I. kirilowii*
bb. Young stems pubescent with spreading sub-appressed hairs.. 5. *I. parkesii*
aa. Fls. less than 1 cm. long ..... 6. *I. pseudotinctoria*

1. **Indigofera chenii** Chien (Sc. C. 9:150). Shrub, to 1 m.; fls. VIII–IX; fr. IX–X. China; locally in Ku. Brushland.
2. **Indigofera carlesii** Craib (Ed. N. 8:48). Shrub, to 0.5 m.; fls. pink, IV–V; fr. VIII–IX. China; locally in Ki. Ku. Brushland.
3. **Indigofera fortunei** Craib (Ed. N. 8:53). Shrub, to 0.5 m.; fls. red-purple, IV–V; fr. VIII–IX. China; locally in An., Ki., Ku. Brushland.
4. **Indigofera kirilowii** Maxim. ex Palib. 苦掃根 (K'u Sao Kên; Bitter Broom-root) (R.M. 503). Shrub, to 1 m.; fls. pink, V–VII; fr. IX. China, Korea; locally in An., Che., Hup., Ki. Brushland.
5. **Indigofera parkesii** Craib (Ed.N. 8:59). Shrub, to 0.5 m.; fls. white, V–VIII. China; locally in An., Che. Grassland.
6. **Indigofera pseudotinctoria** Matsum. 馬棘 (Ma Chi; Horse Bramble) (Ed. N. 8: 69,75). Shrub, to 1 m.; fls. pink, small, VI–VIII; fr. IX–X. China, Japan; locally in An., Che., Ki., Ku. Brushland.

25. **Millettia** Wight & Arn. 崖豆藤屬 (Yai Tou T'êng Shu; Cliff Bean-vine Genus)

Trees and *shrubs*, often *climbing*, with pinnate lvs.: *fls. showy*, *in* axillary or terminal *clusters*, white, purple or red; *anthers obtuse*, *basifixed*: pods flat, woody, slowly or not at all dehiscent. 60–100 species, in the eastern tropics; about 20 in China. (In honor of J. A. Millett, an English physician and botanist who wrote on China in 1726.)

1. **Millettia reticulata** Benth. 鷄血藤 (Chi Hsüeh T'êng; Chicken's-blood Vine) (Be. F. sup. 13). Woody vine; fls. purple, in large panicles, VII; fr. X. China, Formosa; locally in An., Che., Ki., Ku. Woodland.

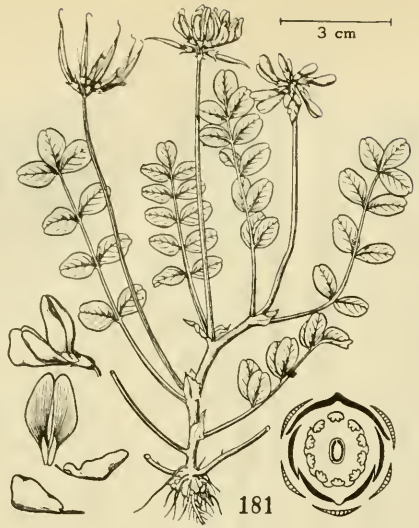
26. **Astragalus** Linn. Milk Vetch 紫雲英屬 (Tzŭ Yün Ying Shu)

Mostly *herbs*, with pinnate lvs.: *fls. in* spikes or racemes, often forming *a head-like cluster* at the top of a scape; *keel of the corolla equal to or a little shorter than the wings*; *stigma small*; stamens diadelphous: pods several-seeded, usually turgid. About 1500 species, widely distributed; over 20 in China. (The old Greek name for some leguminous plant.)

Key to the Species

Fls. pinkish purple: stem ascending ..... 1. *A. sinicus*
Fls. white: plant nearly stemless ..... 2. *A. scaberrimus*

1. **Astragalus sinicus** Linn. Chinese Milk Vetch 紫雲英 (Tzŭ Yün Ying; Purple-cloud Flower) (Mak. F. 422). Ascending herb; fls. pink, III–IV; fr. black, V–VI; with weak stems. China, Japan; locally in An., Che., Ku. Swamps and rice land. Fig. 181.



181. Astragalus sinicus
182. Dalbergia hupeana

183. Trifolium repens
184. Medicago hispida

185. Phaseolus aureus
186. Vigna unguiculata

2. **Astragalus scaberrimus** Bunge 春黃芪 (Ch'un Huang Ch'i; Spring Yellow-root) (Bunge 17). Perennial herb; fls. white, IV. Northern and northeastern China; locally in An. Open grassland.

27. **Gueldenstaedtia** Fisch. 米口袋属 (Mi K'ou Tai Shu)

Perennial *herbs* with pinnate lvs.: fls. solitary or in umbels, on long peduncles; *keel of the corolla less than half the length of the standard and wings*; *stigma broad.* 7–8 species, Asiatic, most of them in China. (In honor of A. Gueldenstaedt, a Russian naturalist.)

Key to the Species

Lfts. 9–13: peduncles much longer than the lvs. ..... 1. *G. henryi*
Lfts. 13–17: penduncles equalling or little longer than the lvs. ..... 2. *G. multiflora*

1. **Gueldenstaedtia henryi** Ulbrich (E.J. 36, Beibl. 82:59). Tufted herb; fls. purple, IV; fr. V. China; locally in Ku. Well-drained soil.
2. **Gueldenstaedtia multiflora** Bunge 米口袋 (Mi K'ou Tai; Rice-bag) (H.F. 2:118). Tufted herb; fls. purple, IV; fr. V. China; locally in Ku. Rocky slopes.

28. **Dalbergia** Linn. f. 黃檀属 (Huang T'an Shu)

Trees, shrubs or woody *climbers*, with pinnate lvs.: fls. small and numerous, in terminal axillary panicles, white or purple: *pod flat, indehiscent*, 1–4-seeded. About 100 species, in all tropical regions; 25–30 in China. (In honor of N. Dalberg, a Swedish physician and botanist, 1730–1820.)

Key to the Species

Trees: lfts. ovate-oblong, rounded at base, 20–30 mm. wide: pods 12–15 mm. wide, 1–4-seeded ..... 1. *D. hupeana*
Woody climbers: lfts. oblong, cuneate at base, 8–15 mm. wide: pods 10–12 mm. wide, 1–2-seeded ..... 2. *D. hancei*

1. **Dalbergia hupeana** Hance 黃檀 (Huang T'an; Yellow Sandalwood) (Lee 664). Tree, to 15 m.; fls. cream yellow, VI; fr. VIII–X; trunks angular. China; locally in An., Ki., Ku. Woodland. Fig. 182.
2. **Dalbergia hancei** Benth. (Lee 666). Woody climber; fls. greenish white, V; fr. VII–IX. South China; locally in An., Che., Ki. Brushy woodland.

29. **Erythrina** Linn. Coral Tree 刺桐属 (Tz'ŭ T'ung Shu; Thorny-aleurites Genus)

Mostly *woody plants*, sometimes herbaceous at the top, usually with prickly brs.: lvs. trifoliolate, bearing large glands at the tips of the petioles; lfts. entire: *fls. large, red, in dense terminal racemes*; calyx oblique or 2-lipped; *petals* very *unequal*: the standard infolded. 30–50 species, in tropical regions; 1 cultivated in China. (Greek: *eruthros*, red, on account of the color of the fls.)

1. **Erythrina corallodendron** Linn. 象牙紅 (Hsiang Ya Hung; Red Elephant's-tusk) (B.M. 578). Shrub, to 2 m.; fls. crimson; seeds scarlet, with black spot. Introduced from West Indies; locally in Ku. Planted, ornamental.

30. **Spartium** Linn. 鷹爪属 (Ying Chao Shu)

A *shrub* with nearly leafless brs. bearing *a few small simple lvs.* with entire

margins: fls. yellow, in terminal racemes; *calyx 1-lipped*; *stamens monadelphous*: *pods compressed*, many-seeded. 1 species, native to the Mediterranean region, introduced in China. (The old Greek name.)

1. **Spartium junceum** Lam. Spanish Broom 鷹爪 (Ying Chao; Eagle-claw) (B.M. 570). Shrub, to 3 m.; fls. yellow, V; fr. IX; brts. slender, terete, grooved, rush-like. Introduced from Mediterranean region; locally in Ku. Cultivated, ornamental.

31. **Crotalaria** Linn. Rattle Box 野百合属 (Yeh Pai Ho Shu)

Herbs or shrubs: lvs. 1–7-foliolate, the *margins entire*: *calyx* 5-cleft, slightly *2-lipped*; corollas yellow or purplish; *stamens* 10 *monadelphous*; anthers of two forms, alternately arranged: *pods inflated*. About 250 species, mostly tropical; 15 in China. (Greek: *krotalon*, a rattle.)

Key to the Species

Lfts. elliptic-oblong: pedicels about 1 cm. long: calyx lobes narrowly lanceolate, slightly hairy, small ..... 1. *C. chinensis*
Lfts. linear to lanceolate: pedicels shorter: calyx lobes broader, densely hairy, enlarged and completely enclosing the pod ..... 2. *C. sessiliflora*

1. **Crotalaria chinensis** Linn. (H.F. 2:73) (Herb, to 0.5 m.; fls. yellow, VIII; fr. IX; pods exserted. Eastern Asia, Malaya; locally in An., Ki. Field weed.
2. **Crotalaria sessiliflora** Linn. 野百合 (Yeh Pai Ho; Wild Lily) (Mak. F. 429) Herb, to 0.5 m.; fls. brown, VIII; fr. brown, IX–X. Eastern Asia, Malaya; locally An., Ki., Ku. Roadside weed.

32. **Trifolium** Linn. Clover 翹搖属 (Ch'iao Yao Shu)

Herbs with mostly *3-foliolate lvs.*, the *margins denticulate*: *fls. in* dense *head-like clusters*, red, pink, white or yellow; calyx teeth nearly equal; petals withering but persistent; *stamens diadelphous*, 9 and 1; anthers all alike: *pods membranous*, *enclosed by the persistent petals*, 1–6-seeded. About 300 species in temperate regions; 2 or 3 cultivated in China. (Latin: *tres*, three; and *folium*, a leaf.)

Key to the Species

Plant hairy: fls. rose-purple, sessile: lfts. ovate or obovate: stems ascending .. 1. *T. pratense*
Plant glabrous: fls. white, pedicellate: lfts. obcordate: stems creeping ..... 2. *T. repens*

1. **Trifolium pratense** Linn. Red Clover 紅荷蘭翹搖 (Hung Ho Lan Ch'iao Yao; Red Holland-clover) (B.M. 581). Ascending herb; fls. red, V–VII. Introduced from Europe; locally in Ki., Ku. Fields and roadsides.
2. **Trifolium repens** Linn. White Clover 白荷蘭翹搖 (Pai Ho Lan Ch'iao Yao; White Holland-clover) (B.M. 581). Creeping herb; fls. white, IV–V. Introduced from Eurasia, North America; locally in Ku. Moist lawns and roadsides. Fig. 183.

33. **Melilotus** Mill. Sweet Clover 草木樨属 (Ts'ao Mu Hsi Shu; Herbaceous Osmanthus Genus)

Herbs, often biennial, with *3-foliolate lvs.*: *fls.* small, white or yellow, *in* slender axillary *racemes*; *stamens diadelphous*; anthers all alike: *pods coriaceous*, *wrinkled*,

not coiled. About 20 species, in the eastern hemisphere; 8 in China. (Greek: *meli*, honey; and *lotos*, some legume, on account of the fragrance of the fls.)

Key to the Species

Stipules broad and denticulate at the base (sometimes obsoletely so): fls. small, 2.5–3 mm. long; calyx segments broad, sometimes obtuse: legume subglobose ..... 1. *M. indicus*

Stipules narrow, entire, subulate-setaceous; fls. larger, 3–4 mm. long; calyx segments narrow, slenderly pointed; legume ovate-elliptic; upper suture keeled and smooth ..... 2. *M. suaveolens*

1. **Melilotus indicus** (L.) All. (*M. parviflora* Desf.) 郎目巴花 (Lang Jih Pa Hua; Young-gentleman's-hope Flower; Ko. F. 11:189) (B.M. 583). Bushy herb, to 1 m.; fls. yellow, VI–VII; fr. VII–IX. Introduced from Europe; locally in An., Ku. Roadside weed.
2. **Melilotus suaveolens** Ledeb. (Mak.F. 427). Bushy herb, to 1 m.; fls. yellow, IV–VII; fr. VI–VIII. Northeastern Asia; locally in Ku. Waste land.

34. **Medicago** Linn. Medick 苜蓿属 (Mu Su Shu)

Herbs, rarely woody, with *3-foliolate lvs.*: lfts. denticulate and nerved: fls. in short dense axillary racemes, yellow or purple; stamens diadelphous: *pods coriaceous, curved or coiled.* About 50 species, in the eastern hemisphere; 4 in China. (Greek: *Medike*, referring to Media, the country from which alfalfa is supposed to have come.)

Key to the Species

a. Perennial: pods loosely coiled, unarmed: fls. purple ..... 1. *M. sativa*

aa. Annual: pods reniform or tightly coiled: fls. yellow.

Pods smooth, 1-seeded: plant pubescent ..... 2. *M. lupulina*

Pods prickly, several-seeded.

Lfts. 1.5–2 cm. long; stipules laciniate: plant glabrous ..... 3. *M. hispida*

Lfts. 0.8–1.2 cm. long; stipules subentire: plant finely downy..... 4. *M. minima*

1. **Medicago sativa** Linn. Alfalfa 紫苜蓿 (Tzŭ Mu Su; Purple Medick) (B.M. 582). Erect herb, to 0.5 m.; fls. bluish purple, IV–VI; fr. V–VII. Introduced from Europe; locally in Ku. Cultivated, fodder.
2. **Medicago lupulina** Linn. Hop Clover 天藍 (T'ien Lan; Heavenly Blue) (G.M. 895). Prostrate herb; fls. yellow, IV–V; fr. V–VI. Naturalized from Europe; locally in An., Ku. Dry grassland and fields.
3. **Medicago hispida** Gaertn. (*M. denticulata* Willd.) Bur Clover 苜蓿 (Mu Su; Medick) (B.M. 582). Prostrate herb; fls. yellow, IV–V; fr. V–VI. Naturalized from Europe; locally in Che., Ku. Roadside and lawn weed. Fig. 184.
4. **Medicago minima** (L.) Lam. Little Medick 小苜蓿 (Hsiao Mu Su) (G.M. 896). Prostrate herb; fls. yellow, IV–VIII; fr. V–VIII. Eurasia, North Africa; locally in An., Ku. Roadside weed.

35. **Phaseolus** Linn. Bean 菜豆属 (Ts'ai Tou Shu)

Twining or erect herbs, with 3-foliolate lvs.; lfts. stipellate: fls. in axillary racemes; lower tooth of calyx longer than the others; *keel of the corolla coiled; style bearded along one side*: pods linear to oblong, straight or curved. 50–200 species, in

tropical and temperate regions; 5 or more cultivated in China. (The old name of the Kidney Bean.)

Key to the Species

a. Fls. white, cream-colored or purple: pods compressed, or oval in section, not flattened; seeds 1–1.5 cm. long ..... 1. *P. vulgaris*
aa. Fls. yellow: pods cylindrical; seeds much smaller.
Floral bracts ovate to ovate-lanceolate, equalling the calyx: lfts. ovate or rhombic-ovate.
Plant and pods very hairy; seeds usually green ..... 2. *P. aureus*
Plant and pods glabrous or only thinly hairy; seeds usually red-brown ..... 3. *P. angularis*
Floral bracts narrowly lanceolate, longer than the calyx: lfts. lanceolate-ovate ..... 4. *P. chrysanthos*

1. **Phaseolus vulgaris** Linn. Kidney Bean 菜豆 (Ts'ai Tou; Vegetable Bean) (B.M. 574). Twining herb; fls. pink or white, VI–IX; fr. VII–X; seeds white or brown. Introduced, probably of American origin; locally in An., Ki., Ku. Cultivated, vegetable.
2. **Phaseolus aureus** Roxb. Green Gram 緑豆 (Lu Tou; Green Bean) (B.M. 575). Bushy herb, to 0.5 m.; fls. greenish yellow, VII; fr. VIII–X. Introduced, probably of Indian origin; locally in An., Che., Ku. Cultivated, vegetable. Fig. 185.
3. **Phaseolus angularis** Wight Adzuki Bean 赤小豆 (Ch'ih Hsiao Tou; Small Red-bean) (B.M. 575). Bushy herb, to 8 dm.; fls. yellow, VIII. Asia; locally in An., Ku. Cultivated, vegetable.
4. **Phaseolus chrysanthos** Savi (DC.P. 2:395). Twining vine; fls. yellow, IX; fr. X; seeds red-brown. Field and roadside weed.

36. **Vigna** Savi 豇豆属 (Kan Tou Shu)

Similar to *Phaseolus*, but with the *keel of the corolla curved, not coiled*; and with the *pods long and slender*, and *seeds never broad and flat*. 30–60 species, in tropical and temperate regions; 3 or more in China. (In honor of Dominicus Vigni, an Italian scientist of the 17th century.)

Key to the Species

Pods inflated and flabby when green, up to 1 m. long, often eaten as a vegetable ..... 1. *V. sesquipedalis*
Pods hard and firm, not inflated and flabby, up to 30 cm. long, not commonly used for food ..... 2. *V. unguiculata*

1. **Vigna sesquipedalis** (L.) Fruwirth Yard-long Bean 長豆 (Ch'ang Tou; Long Bean) (B.M. 576). Trailing herbaceous vine; fls. yellowish or violet, VI; fr. VIII. Introduced from tropical Asia; locally in Ku. Cultivated, food.
2. **Vigna unguiculata** (L.) Walp. Cowpea 豇豆 (Kang Tou) (Field. 24:365). Erect or scandent herb; fls. yellowish, VI; fr. VIII. Introduced from tropical Asia; locally in An., Che., Hup., Ku. Cultivated, fodder. Fig. 186.

The several varieties and forms going under the names *Vigna catjang* Walp. and *V. sinensis* (L.) Savi have been found by Dalziel to be attributable to *V. unguiculata*. See " The Useful Plants of West Tropical Africa," pp. 266–269.

37. **Dolichos** Linn. 扁豆属 (Pien Tou Shu)

Plants herbaceous or somewhat woody, mostly twining; distinguished from *Phaseolus* by having the *keel of the corolla bent at right angles, not coiled*; and separated from *Vigna* by having *flattened*, usually curved, *pods and broad seeds*. 20–50 species, in the eastern tropics; 1 or 2 cultivated in China. (Greek: *dolichos*, long, used by Theophrastus for some kind of bean.)

1. **Dolichos lablab** Linn. Hyacinth Bean 扁豆 (Pien Tou; Flat Bean) (B.M. 575). Twining vine; fls. lavendar or white, VIII–X; fr. IX–X; pod flat. Introduced from eastern tropics; locally in An., Ku. Cultivated, vegetable. Fig. 187.

38. **Rhynchosia** Lour. 鹿藿属 (Lu Ho Shu)

Twining (ours) or erect *herbs*: *lfts.* often punctate, not stipellate: fls. yellow; stamens diadelphous; style beardless: *pods rounded or oblong*, 1–2-seeded. About 200 species, in warm regions; 4 in China. (Greek: *rhunchos*, a beak, from the shape of the keel.)

1. **Rhynchosia volubilis** Lour. 鹿藿 (Lu Ho; Stag Vegetable) (Be.F. 90). Twining vine; fls. white; fr. red, IX–X; seeds black and shining. Japan, Formosa, China; locally in An., Che., Ki., Ku. Brushland, grassland. Fig. 188.

39. **Canavalia** DC. 刀豆属 (Tao Tou Shu)

Coarse *twining* (ours) or erect *herbs*: *lfts. stipellate*: fls. rose-colored, bluish or violet; calyx strongly 2-lipped, the upper lip prominent; stamens monadelphous; style beardless: *pods large, flat and woody, several-seeded, ribbed on both sides of the upper margin*. 15–25 species, in the tropics: 2 in China. (From the Malabar name of one of the species.)

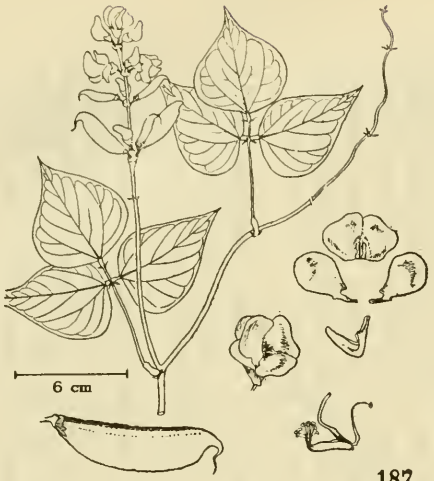
1. **Canavalia ensiformis** DC. Jack Bean 刀豆 (Tao Tou; Knife Bean) (M.F. 258). Twining herb; fls. VI–VII; pod 15 cm. long. Introduced from tropical countries; locally in Ki. Cultivated, vegetable. Fig. 189.

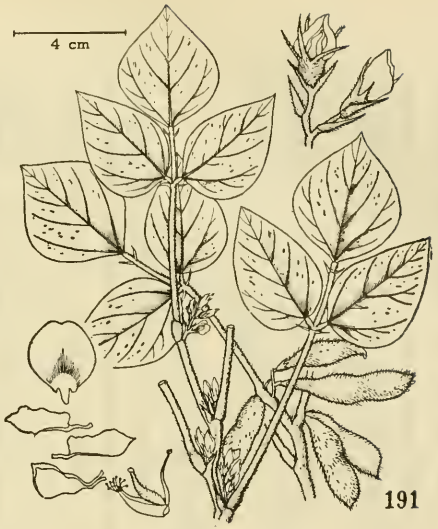
40. **Pueraria** DC. 葛属 (Ko Shu)

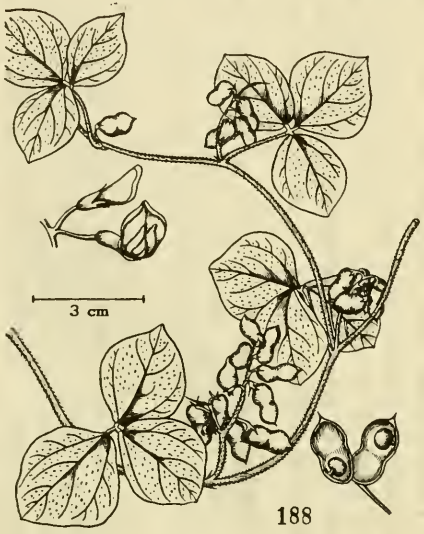
Twining vines with *stipellate lfts.*: ours coarse-hairy and with large woody tuberous roots: fls. densely fascicled (in ours), blue or purple, with slender caducous bracts; lower teeth of the calyx prominent; *standard auricled* at the base; stamens monadelphous: *pods linear, compressed*, several-seeded. 12–15 species, in tropical Asia and Malaya; 4 in China. (For M. N. Puerari, a botanist of Geneva.)

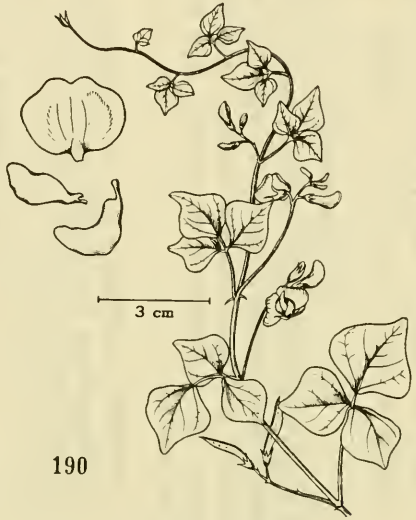
1. **Pueraria lobata** (Willd.) Ohwi (*P. thunbergiana* Benth.) Kudzu Vine 葛 (Ko) (R.M. 522). Twining vine; fls. purplish red, VII–IX; fr. brown, X. China, Japan; locally in An., Che., Hon., Ki., Ku. Grass- and brush-land.

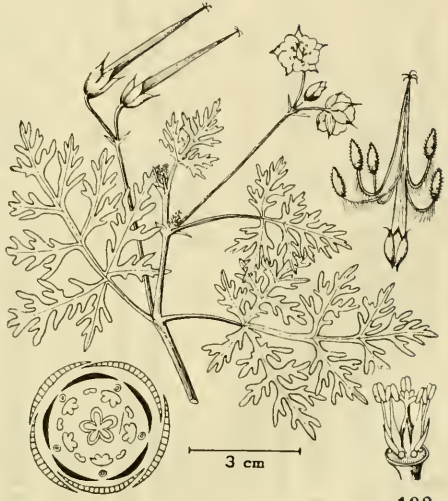
Ohwi (Bull. Tokyo Sci. Mus. No. 18:, p. 16, 1947) gives the correct name and bibliography for this plant which was long ago carefully described and figured by Houttuyn under the name *Dolichos trilobus* (Houtt. Nat. Hist. II. 10:153, t. 64, f. 1. 1779). This name had already been given by Linnaeus to another plant, so it cannot, under the rules of nomenclature, be used for Houttuyn's plant. Willdenow's valid name under *Dolichos*, *D. lobatus* (Willd. Sp. Pl. 3 (2): 1047. 1803) has been overlooked, perhaps because he erroneously states that the plant came from the Cape of Good Hope, while Houttuyn's original reference tells specifically that the specimen from which the figure was drawn came from Japan. In Panzer's German translation











187. Dolichos lablab
188. Rhynchosia volubilis

189. Canavalia ensiformis
190. Dunbaria sp.

191. Glycine soja
192. Erodium stephanianum

of Houttuyn's work, cited by Willdenow, it is recorded that this species resembles plants from the Cape of Good Hope.

41. **Dunbaria** Wight & Arn. 野扁豆属 (Yeh Pien Tou Shu)

Twining herbs: *lfts. punctate* beneath, *without stipels*: fls. few, in racemes, or solitary; keel distinctly beaked; lower teeth of the calyx prominent; *standard not auricled*; stamens diadelphous: *pods linear, flattened.* About 15 species, eastern Asia to Australia; 2 in China. (In honor of George Dunbar, 1784–1851, professor of Greek at Edinburgh.) Fig. 190.

1. **Dunbaria villosa** (Thunb.) Mak. (*D. subrhombea* (Miq.) Hemsl.) 野扁豆 (Yeh Pien Tou; Wild Dolichos). Mak. F. 402. Twining vine; fls. reddish, VIII–IX. Malaya, China, northern Australia; locally in Ki., Ku., An., Che. Brush- and grass-land.

42. **Glycine** Linn. 黄豆属 (Huang Tou Shu)

Herbs, many twining, with 3-, 5- or 7-foliolate lvs.: *fls. small, white to purple, in axillary racemes*; *petals about equal*, the standard not infolded: *style short, beardless*: pod narrow, somewhat flattened and usually constricted between the seeds. About 40 species, tropical and subtropical parts of the Eastern hemisphere; 4 in China. (Greek: *glukus*, sweet.)

Key to the Species

Bushy herb: lfts. broadly ovate, 8–10 cm. long: legumes at maturity yellowish brown, coarsely hairy, 7–8 mm. broad	1. *G. soja*
Twining herb: lfts. oblong or narrowly ovate, 3–5 cm. long: legumes at maturity dark brown, silky pubescent, about 5 mm. broad	2. *G. ussuriensis*

1. **Glycine soja** (L.) Sieb. & Zucc. Soy Bean 黄豆 (Huang Tou; Yellow Bean) (*G. hispida* (Moench) Maxim.); *Soja max* (L.) Piper; *G. max* (L.) Merr.) (B.M. 579). Bushy herb, to 0.5 m.; fls. purplish, VII; fr. brown, IX. China, Japan; locally in An., Ki., Ku. Cultivated, vegetable and field crop. Fig. 191.
2. **Glycine ussuriensis** Regel & Maack (Ko. & Kl. t. 205). Twining herb; fls. violet, VII; fr. VIII–IX. Northeastern Asia; locally in Ku. Grassland and brushland.

82. **GERANIACEAE** Geranium Family 牻牛兜科 (Mang Niu Êrh K'o)

Herbs (ours), occasionally woody plants, with stipulate lvs.: fls. bisexual and usually regular or nearly so; sepals and petals 5; stamens 5 or 10; pistil 3–5-lobed; the *5 one-seeded carpels* of the fr. *separating from the base* upward *at maturity*, but remaining joined by the persistent styles. 11 genera with 640 species, in temperate and subtropical regions; 3 genera and over 10 species in China.

Key to the Genera

Fls. regular, without spurs.	
Lvs. pinnately cleft or dissected: anther-bearing stamens 5: recurved tails of the carpels bearded on the inside and often spirally twisted	1. *Erodium*
Lvs. palmately cleft or dissected: anther-bearing stamens usually 10: recurving tails of the carpels glabrous on the inside	2. *Geranium*
Fls. irregular, the calyx bearing a nectariferous spur	3. *Pelargonium*

1. **Erodium** L'Her. Heronsbill 大陽花属 (Ta Yang Hua Shu)

Lvs. pinnately dissected or compound: *anther-bearing stamens 5*: the recurved tails

of the *styles bearded on the inside.* About 60 widely distributed species, 1 in China. (Greek: *erodios*, heron; "Heron's bill" refers to the fruit.)

1. **Erodium cicutarium** (L.) L'Her. Alfilaria 荷蘭牻牛兜 (Ho Lan Mang Niu Êrh; Holland Geranium) (G.M. 950). Spreading annual; fls. pink. Introduced from Europe; locally in Ku. Occasional.

Erodium stephanianum Willd. (DC. P. 1:645), with leaves bipinnatifid into narrow segments, and with the rachis winged between the pinnae, occurs in North China. Fig. 192.

2. **Geranium** Linn. Cranesbill 牻牛兜属 (Mang Niu Êrh Shu; Savage-cattle Genus)

Much-branched weak-stemmed herbs with swollen nodes: *lvs. palmately* cleft or dissected: *fls. regular, without spurs*, usually with *10 anther-bearing stamens*: the recurved tails of the *styles glabrous on the inside.* About 260 species, widely distributed in temperate regions; 15 in China. (Greek: *geranos*, a crane; "Crane's bill" refers to the fruit.)

Key to the Species

a. Lvs. dissected into linear divisions: peduncles 2-fld ..... 1. *G. dissectum*
aa. Lvs. cleft or incised, but the divisions not linear: peduncles usually 1-fld.
Sepals about 5 mm. long: lobes of the lvs. lanceolate, acute, incised.. 2. *G. sibiricum*
Sepals 7–10 mm. long.
Lobes of the lvs. broad-ovate, obtuse..... 3. *G. kraemeri*
Lobes oblong-ovate, acuminate or acute ..... 4. *G. wilfordii*

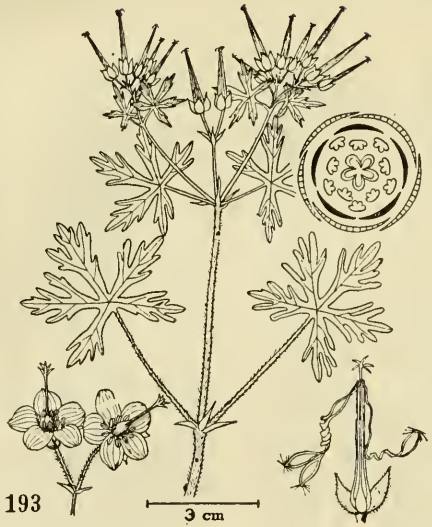
1. **Geranium dissectum** Linn. 鷺嘴花 (Lu Tsui Hua; Egretsbill Flower) (G.M. 948). Decumbent herb, to 0.5 m.; fls. pink, IV–V; fr. V–VI. Northern hemisphere; locally in Ku. Moist places. Fig. 193.
2. **Geranium sibiricum** Linn. 老鴉嘴 (Lao Ya Tsui; Crowsbill) (G.M. 947). Weak herb, to 0.5 m.; fls. pink, VII–IX; fr. VIII–IX. Eurasia; locally in An., Ki. Damp brush- and wood-land.
3. **Geranium kraemeri** Franch. & Savat. 三葉風露 (San Yeh Fêng Lu; Trifoliate Spirit-of-dew) (E.P. 53:192). Trailing herb; fls. pink, VIII; fr. IX. Eastern Asia; locally in An., Ki. Forest shade.
4. **Geranium wilfordii** Maxim. 小牻牛兜 (Hsiao Mang Niu Êrh; Small Cranesbill) (E-P. 53:191). Trailing herb; fls. pink, VII. Eastern Asia; locally in Ki. Forest shade.

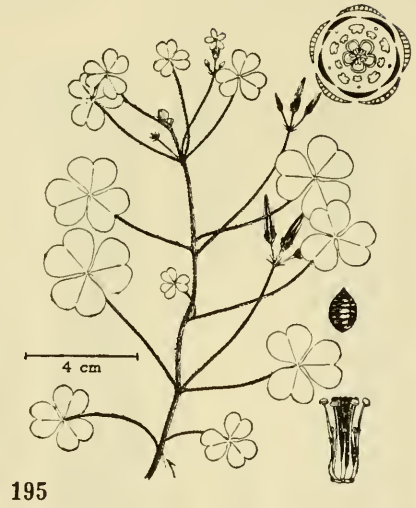
3. **Pelargonium** L'Her. Storksbill 天竺葵属 (T'ien Chu K'uei Shu)

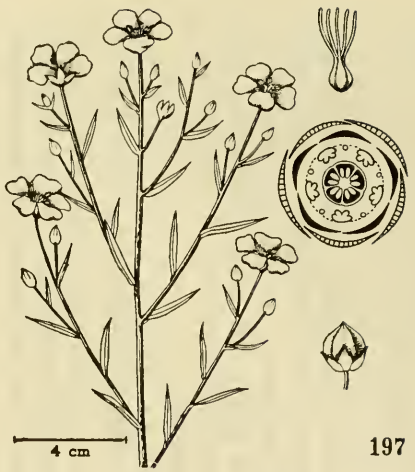
Strong-smelling succulent plants with lobed or dissected lvs. and somewhat *irregular fls.*: calyx bearing a nectariferous spur: *stamens 10*; carpels coiling as they separate at maturity. About 230 species, mostly of southern Africa; 3 cultivated in China. Source of the "Geranium" of florists. (Greek: *pelargo*, stork; "Stork's bill" refers to the fruit.)

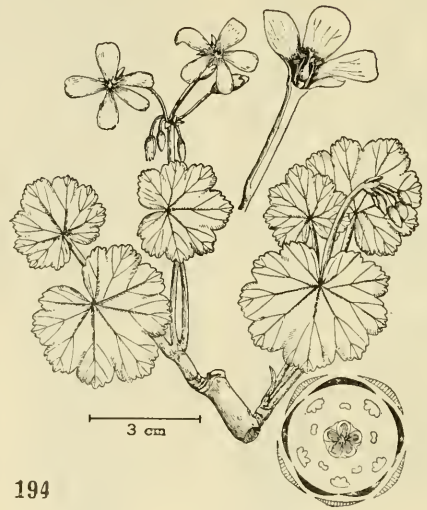
Key to the Species

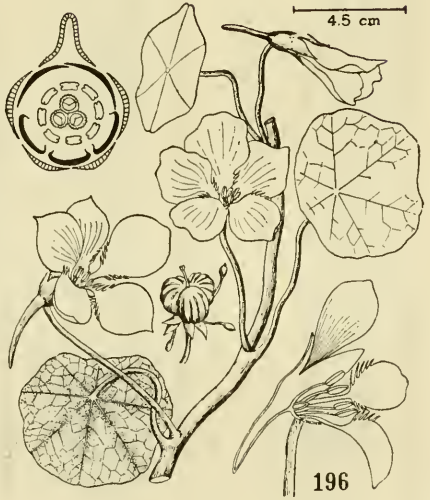
Lvs. not peltate: plants pubescent: stems stout.
Lvs. deeply lobed or cleft: fls. about 1 cm. long ..... 1. *P. graveolens*











193. Geranium dissectum
194. Pelargonium hortorum

195. Oxalis corniculata
196. Tropaeolum majus

197. Linum stellarioides
198. Tribulus terrestris

Lvs. shallowly lobed: fls. up to 2 cm. long..... 2. *P. hortorum*
Lvs. peltate: plants glabrous or nearly so: stems weak and trailing..... 3. *P. peltatum*

1. **Pelargonium graveolens** L'Her. 香草 (Hsiang Ts'ao; Fragrant Herb) (B.M. 599). Bushy plant, to 1 m.; fls. rose or pink. Introduced from South Africa; locally in Ku. Planted, ornamental.
2. **Pelargonium hortorum** Bailey Fish Geranium 天竺葵 (T'ien Chu K'uei; Indian Sunflower) (B.M. 597). Stout succulent plant; fls. red, pink, salmon, white. Cultigen; locally in Ku. Planted, ornamental. Fig. 194.
3. **Pelargonium peltatum** Ait. Ivy Geranium 藤本天竺葵 (T'êng Pên T'ien Chu K'uei) (B.M. 597). Weak, often trailing plant; fls. rose-carmine. Introduced from South Africa; locally in Ku. Planted, ornamental.

83. OXALIDACEAE Wood Sorrel Family 酢醬草科 (Tso Chiang Ts'ao K'o)

Herbs or trees with sour juice and *compound* stipulate *lvs.*: *fls. regular*; sepals and petals 5; stamens 10; ovary 5-celled, the carpels remaining united at maturity; styles free: fr. a capsule or berry. About 8 genera with 300 species, in temperate and tropical regions; 3 genera and 10 species in China.

1. **Oxalis** Linn. Wood Sorrel 酢醬草属 (Tso Chiang Ts'ao Shu)

Low *herbs* (ours) with sour taste and alternate *3-foliolate lvs.*: fls. yellow or pink: *fr.* an oblong 5-angled loculicidal *capsule*. About 250 species, mostly of South America and South Africa; 6 in China. (Greek: *oxus*, sour.)

Key to the Species

Fls. yellow: plant with creeping stems ..... 1. *O. corniculata*
Fls. pink: plant acaulescent, with many small bulbs ..... 2. *O. corymbosa*

1. **Oxalis corniculata** Linn. (*O. repens* Thunb.) Creeping Lady's Sorrel 酢醬草 (Tso Chiang Ts'ao; Brewing-sauce Plant) (G.M. 944). Decumbent herb to 20 cm; fls. yellow, IV–X; fr. V–X. Widely distributed; locally in An., Che., Hon., Ki., Ku. Roadside weed. Fig. 195.
2. **Oxalis corymbosa** DC. (*O. martiana* Zucc.*) 紫酢醬草 (Tzŭ Tso Chiang Ts'ao; Purple-flowered Oxalis) (B.C. 2418). Tufted herb; fls. purple, V. Introduced from Brazil; locally in Ki., Ku. Planted, ornamental.

*E. D. Merrill states that this problem has been "critically worked out by C. A. Backer on the basis of exact dates of issue of the publications by de Candolle versus Zuccarini, and de Candolle was earlier. Backer was very careful in such matters." Accordingly, *O. corymbosa* DC. appears in place of *O. martiana* Zucc.

84. TROPAEOLACEAE Tropaeolum Family 金蓮花科 (Chin Lien Hua K'o)

Succulent herbs, often climbing by coiled petioles: roots sometimes tuberous: *lvs.* alternate, *simple*, *peltate*: *fls.* solitary on axillary peduncles, *very irregular*, showy; sepals 5, one forming a long nectar-bearing spur; petals 5, clawed; stamens 8: fr. of *3* one-seeded *carpels* which separate at maturity. Only the following genus.

1. **Tropaeolum** Linn. 金蓮花属 (Chin Lien Hua Shu)

Characters of the family. 50 species, from Mexico to Chile; 2 grown for ornament in China. (Greek: *trophy*, on account of the peltate or shield-like leaves.)

1. **Tropaeolum majus** Linn. Garden Nasturtium 金蓮花 (Chin Lien Hua: Golden-lotus Flower) (B.M. 602). Twining herb; fls. orange-yellow, V. Introduced from South America; locally in Ku. Planted, ornamental. Fig. 196.

85. LINACEAE Flax Family 亞麻科 (Ya Ma K'o)

Erect herbs or shrubs with *simple* usually alternate *lvs.*: *fls.* perfect, *regular*, 5-merous; *filaments united at the base*; carpels 2–5, or twice as many by the growth false septa; style free: fr. a capsule or drupe. About 14 genera with 150 species, widely distributed: 3 genera and 9 species in China.

1. Linum Linn. Flax 亞麻屬 (Ya Ma Shu)

Erect herbs with tough cortex and narrow sessile lvs.: fls. red, yellow, blue or white; *styles 5*: *fr. a capsule.* Nearly 100 species, in temperate and warm regions; 4–5 in China. (The Latin name).

Key to the Species

Fls. yellow	1. *L. flavum*
Fls. blue or white	2. *L. perenne*

1. **Linum flavum** Linn. (B.M. 603). Perennial, to 0.5 m.; fls. yellow; lvs. spatulate. Introduced from Europe; locally in Ku. Planted, ornamental.
2. **Linum perenne** Linn. 亞麻 (Ya Ma) (B.M. 604). Perennial, to 0.7 m.; fls. blue or white; lvs. linear. Introduced from Europe; locally in Ku. Planted, ornamental.

Linum stellarioides Planch. is found in northern China, and may extend southward into our area. Fig. 197.

86. ZYGOPHYLLACEAE Caltrop Family 蒺藜科 (Chi Li K'o)

Herbs, shrubs or trees with usually *opposite stipulate undotted lvs.*: fls. perfect, regular, obdiplostemonous; *stamens free*; anthers basifixed; style 1; carpels united or splitting apart at maturity. 21 genera with 150 species; 4 genera and 5 species in China.

1. Tribulus Linn. Caltrop 蒺藜屬 (Chi Li Shu)

Spreading *herbs* with *pinnate lvs.*: *fr. splitting* at maturity *into* 5–12 *spiny* 1-seeded *nutlets*. About 15 species, widely distributed, 2 in China. (Latin: *tribulus*, a caltrop, an iron crowfoot used in war.)

1. **Tribulus terrestris** Linn. Puncture Vine 蒺藜 (Chi Li; Thorny Plant) (G.M. 950). Prostrate herb; fls. pale yellow, V–IX; fr. spiny, VI–X. The eastern hemisphere; locally in An., Hon., Ku. Weed in sandy soil. Fig. 198.

87. RUTACEAE Rue Family 芸香科 (Yün Hsiang K'o; Rich-fragrance Family)

Trees, shrubs or herbs with aromatic *punctate* exstipulate *lvs.* and *regular fls.*: *stamens* 8–15, *borne on a disc*; ovary superior: fr. a berry or capsule, rarely winged. 120 genera and 1,000 species, mostly tropical; 18 genera and 40 species in China.

Key to the Genera

A. Branches or leaves spiny or prickly: lvs. alternate.

B. Fr. dehiscent, of 1-seeded follicles ..... 1. *Zanthoxylum*
BB. Fr. indehiscent, a hesperidum.
Lvs. deciduous, or nearly so, trifoliolate ..... 2. *Poncirus*
Lvs. evergreen, entire or 1-foliolate.
Ovary 8–15-celled, with several ovules in each cell .... 3. *Citrus*
Ovary 3–5-celled, with 2 ovules in each cell..... 4. *Fortunella*
AA. Branches unarmed.
Lvs. alternate.
Lvs. up to 3×compound: fls. in lax leafy panicles: fr. a 4–5-lobed capsule..... 5. *Boenninghausenia*
Lvs. simple: fls. in dense terminal panicles: fr. a drupe... 6. *Skimmia*
Lvs. opposite, pinnately compound: fr. of 4–5 dehiscent follicles ..... 7. *Evodia*

1. **Zanthoxylum** Linn. Prickly Ash 花椒属 (Hua Chiao Shu)

Aromatic usually *prickly* shrubs or trees with *alternate* pinnate or 3–foliolate *lvs.* fls. dioecious or polygamous; carpels 1–5, 1–seeded, coriaceous or fleshy. About 150 species, mostly tropical and subtropical; 30 in China. (Greek: *xanthos*, yellow; and *xylon*, wood.)

Key to the Species

a. Lvs. 3- or 5-foliolate; rachis broadly winged: thorns flattened, commonly in pairs at the nodes ..... 1. *Z. alatum* var. *planispinum*
aa. Lvs. with more than 5 lfts.; rachis slightly or not at all winged: thorns in pairs or alternately arranged.
b. Lfts. all with distinct petiolules 2–5 mm. long; lf. axis armed with hooked thorns..... 2. *Z. cuspidatum*
bb. Lfts., or most of them, sessile or nearly so.
c. Fls. in terminal panicles; sepals and petals both present.
Lfts. 4–14 cm. long, caudate: thorns on the brs. many, short (1–2 mm. long).
Lfts. densely tomentose beneath, oblong to ovate..... 3. *Z. molle*
Lfts. glabrous, glaucous beneath, lanceolate..... 4. *Z. ailanthoides*
Lfts. 0.5–4 cm. long, lanceolate-obovate-orbicular; glabrous or with scattered hairs above, glabrous, light green and reticulate beneath..... 5. *Z. schinifolium*
cc. Fls. in lateral, often axillary panicles; perianth simple; petals wanting..... 6. *Z. simulans*

1. **Zanthoxylum alatum** Roxb. var. **planispinum** (S. & Z.) Rehd. & Wils. 竹葉椒 (Chu Yeh Chiao; Bamboo-leaf Pepper) (R.M. 524). Shrub, to 4 m.; fls. yellowish, V–VI; fr. VIII–IX. China., Korea, Japan; locally in An., Che., Hup., Ki., Ku. Woodland.

Since Franchet published the name "subtrifoliatum" as a form of *Zanthoxylum alatum* (*Z. alatum* Roxb. forma *subtrifoliatum*), in his Plantae Delavayanae (1889) 124 and not as a variety, the name *Z. alatum* Roxb. var. *planispinum* (S. & Z.) Rehd. & Wils. in Sarg. Pl. Wils. *2* (*1914*) *125* is regarded as the valid name for our plant, rather than *Z. alatum* var. *subtrifoliatum* Franch. as given by Rehder, Bibliography (1949) 382.

2. **Zanthoxylum cuspidatum** Champ. (Be.F. 58). Shrub, to 5 m.; fls. III–IV; fr. IX. Southeastern China; locally in Che., Ki. Forest.

3. **Zanthoxylum molle** Rehd. apud Rehd. & Wils. (AA.J. 8:150). Tree, to 10 m; fls. white, VII–VIII. China; locally in An. Valley woodland.
4. **Zanthoxylum ailanthoides** Sieb. & Zucc. (Sch. H. 2:121). Tree, to 15 m.; fls. greenish white, VIII–IX; fr. IX–X. Japan, China, Korea; locally in Che. Slopes near the sea shore.
5. **Zanthoxylum schinifolium** Sieb. & Zucc. 崖椒 (Yai Chiao; Cliff-pepper) (R.M. 524). Shrub, to 3 m.; fls. V; fr. IX–X; lfts. sessile. China, Korea, Japan; locally in An., Che., Ki., Ku. Woodland.
6. **Zanthoxylum simulans** Hance (*Z. bungei* Hance 1875, not 1866) 花椒 (Hua Chiao; Flower-pepper) (R.M. 524). Glabrous shrub or tree, to 7 m.; fls. V–VI; fr. IX–X. China; locally in An., Che., Ki., Ku. Woodland.

Zanthoxylum setosum Hemsl. appeais to be merely a form of *Z. simulans* with a varying number of setae on the upper suiface of the leaflets. This species was described from material collected neai Kiukiang, Kiangsi. Fruiting specimens and those with staminate flowers were available, but pistillate flowers are also needed to conclude a study on this variable group.

2. **Poncirus** Raf. 枸橘属 (Kou Chü Shu)

Thorny *shrub* or small tree, *deciduous* or nearly so: *lvs. alternate, trifoliolate*: fls. borne on old wood in the early spring: fr. densely pubescent, a 6–8-celled hesperidium; pulp vescicles with hair-like appendages. 1 species, in China. (French: *poncire*, a kind of citron).

1. **Poncirus trifoliata** (L.) Raf. Trifoliate Orange 枸橘 (Kou Chü: Spiny Orange) (R.M. 530). Shrub, to 7 m.; fls. white, IV–VI; fr. VIII–X; brts. spiny and compressed. North China, Korea; locally in An., Hon., Hup., Ki., Ku. Planted, hedges. Fig. 199.

3. **Citrus** Linn. 柑橘属 (Kan Chü Shu; Mandarin Orange Genus)

Evergreen glabrous often *spiny trees and shrubs* with coriaceous *alternate 1-foliolate lvs.*; petiole often winged: fls. axillary, solitary, or fascicled, white, usually perfect; stamens 15 or more: *fr. an 8–15-celled hesperidium*: seeds usually several in each cell. 12 species, tropical Asia and Malaysia; 11 in China. (The ancient name of an aromatic African wood.)

Key to the Species

a. Fr. large, 7 or more cm. in diam.: lvs. 8–10 cm. long; petiole broadly winged: stamens 36 ..... 1. *C. grandis*

aa. Fr. small, 4–6 cm. in diam.: stamens 20–25.

Fr. skin tight: fls. about 1 cm. long: lvs. ovate to oblong, 8–10 cm. long; petioles broadly winged ..... 2. *C. aurantium*

Fr. skin loose: fls. less than 1 cm. long: lvs. elliptic-oblong, 5–8 cm. long; petiole narrowly winged, or scarcely at all winged.

Petioles narrowly winged, 5–10 mm. broad ..... 3. *C. junos*

Petioles thin, scarcely winged ..... 4. *C. reticulata*

1. **Citrus grandis** Osbeck Pummelo (B.M. 610). Tree; fls. white, IV; fr. pale yellow, XI. Asia; locally in An., Che., Ki., Ku. Cultivated, fruit.
2. **Citrus aurantium** Linn. Sour Orange 代代花 (Tai Tai Hua; Flower-of-the-generations) (B.M. 610). Tree; fls. white, IV; fr. orange-yellow, IX. Asia; locally in Ki., Ku. Cultivated, flowers, fruit.

3. **Citrus junos** Tanaka 香橙 (Hsiang Ch'ên; Fragrant Orange) (Hu. C. 47). Tree, to 6 m.; fls. white, IV; fr. IX. China; locally in An., Ki., Ku. Cultivated, flowers, fruit. Fig. 200.
4. **Citrus reticulata** Blanco Tangerine 蜜橘 (Mi Chü) (B.M. 610). Small spiny tree; fls. white, IV; fr. IX. Philippines, southeastern Asia; locally in Che., Ku. Cultivated, fruit.

4. **Fortunella** Swingle Kumquat 金柑属 (Chin Kan Shu; Golden Mandarin-orange Genus)

The *fr.* differs from that of *Citrus* in *having 3–6 cells*, with usually one seed to a cell. 4–5 species, in eastern Asia; 3 in China. (In honor of Robert Fortune, 1813-1880, English traveller, who introduced Kumquat into Europe in 1846.)

Key to the Species

Fr. globular, without persistent style, bright-orange in color ..... 1. *F. japonica*
Fr. oval, with persistent base of style, yellow-orange in color..... 2. *F. margarita*

1. **Fortunella japonica** (Thunb.) Swingle Round Kumquat 圓金柑 (Yüan Chin Kan; Round Mandarin-orange) (B.M. 611). Shrub, fr. bright orange. Eastern Asia; locally in An., Ki., Ku. Cultivated, ornamental.
2. **Fortunella margarita** (Lour.) Swingle Oval Kumquat 羅浮 (Lo Fu) (B.M. 610). Shrub or small tree, to 4 m.; fr. yellow-orange. Eastern Asia; locally in Ki. Cultivated, ornamental.

5. **Boenninghausenia** Reichb. 野椒属 (Yeh Chiao Shu)

Shrub, often with herbaceous branches and *alternate simple to 3×compound lvs.*: lfts. entire: infl. in leafy panicles: fls. white, on slender pedicels; stamens 6–8: *fr. of* 6–8 few-seeded *follicles*. 1 species, in eastern Asia.

1. **Boenninghausenia albiflora** Reichb. 臭節草 (Ch'ou Chieh Ts'ao; Stinking Jointed-herb) (R.M. 527). Suffrutescent, to 1 m.; fls. white, VII–VIII; fr. IX, of 6–8 follicles. Himalayas and eastern Asia; locally in An., Che., Hup., Ki. Brushland and woods. Fig. 201.

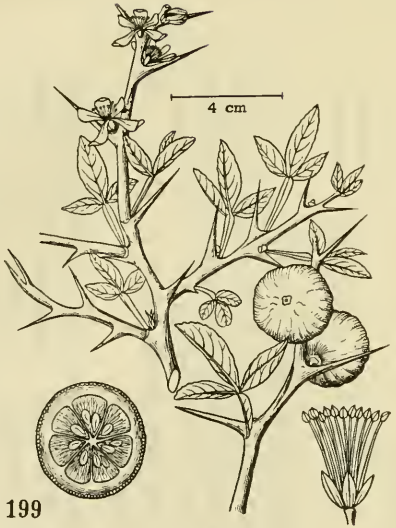
6. **Skimmia** Thunb. 茵芋属 (Yin Yü Shu; Cushion-tuber Genus)

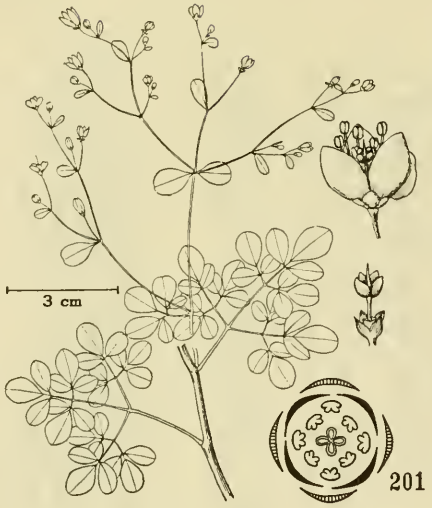
Evergreen glabrous *unarmed shrubs* with *alternate simple* entire *lvs.*: fls. in terminal panicles, white, polygamous; stamens 4–5: *fr. a drupe*, with 2–5 stones. 9 species, Asiatic; 5 in China. (The Japanese name *Skimmi*, means a harmful fruit.)

Key to the Species

Fr. red; lvs. oblong-ovate or oblong-lanceolate.
  Fr. bright red; lvs. oblong-ovate: fls. 4-merous ..... 1. *S. japonica*
  Fr. dark red; lvs. oblong, lanceolate or elliptic fls. 5-merous ..... 2. *S. reevesiana*
Fr. purplish black; lvs. oblanceolate or lanceolate ..... 3. *S. melanocarpa*

1. **Skimmia japonica** Thunb. 茵芋 (Yin Yü; Cushion Tuber) (R.M. 529). Shrub, to 1.5 m.; fls. yellowish green, 4-merous, IV–V; fr. bright red, IX–X. Japan; locally in Che., Ki. Shaded stream banks.
2. **Skimmia reevesiana** Fort. 深紅茵芋 (Shên Hung Yin Yü; Deep-red Skimmia) (R.M. 529). Low shrub; fls. white, IV–VI; fr. red, X. China; locally in An.,





199. Poncirus trifoliata
200. Citrus junos
201. Boenninghausenia albiflora
202. Ailanthus altissima
203. Picrasma quassioides
204. Cedrela sinensis

Che., Hup., Ki. Forest.

3. **Skimmia melanocarpa** Rehd. & Wils. 黑果茵芋 (Hei Kuo Yin Yü; Black-fruited Skimmia) (Pl. W. 2:138). Shrub, to 1 m.; fls. white, IV–VI; fr. purple-black, X. China; locally in An. Forest.

7. **Evodia** Forst. 吳茱萸屬 (Wu Chu Yü Shu)

Unarmed trees or shrubs with *opposite pinnately compound lvs.*: lfts. punctate; margins entire: fls. unisexual; stamens 4–5; carpels 4–5, becoming 2–valved 1–2–seeded dehiscent follicles. About 50 species in eastern and southeastern Asia, Australia and Polynesia; 20 in China. (Greek: *euodia*, pleasant odor.)

Key to the Species

Lfts. and rachis densely pubescent: carpels glabrous, warty..... 1. *E. officinalis*
Lfts. and rachis glabrous or slightly pubescent: carpels densely pubescent on the inner separating faces.
Petals about 2 mm. long, imbricate in the bud..... 2. *E. meliaefolia*
Petals 2.5–3 mm. long, valvate, the edges forming keels in the bud .. 3. *E. glauca*

1. **Evodia officinalis** Dode 吳茱萸 (Wu Chu Yü; Lower-Yangtze Evodia) (R.M. 525). Shrub or tree, to 5 m.; fls. VIII; fr. IX–X. Central and western China; locally in An., Che., Ki., Ku. Woodland.
2. **Evodia meliaefolia** Benth. 辣樹 (La Shu; Pungent Tree) (Lee 680). Tree, to 30m.; fls. VI–VIII; fr. IX–X; carpels usually 5. South China; locally in An., Che., Ki. Woodland.
3. **Evodia glauca** Miq. 臭辣樹 (Ch'ou La Shu; Stinking Pungent Tree) (Lee 678). Tree, to 15 m.; fls. VIII; fr. IX; carpels usually 4. Eastern and central China; locally in An., Hup., Ki. Forest.

88. **SIMAROUBACEAE** Quassia Family 樗樹科 (Ch'u Shu K'o)

Trees or shrubs with *bitter bark* and with *alternate pinnate undotted lvs.*: *fls.* small, *polygamous*; carpels 2–5: fr. a drupe, berry or samara. 28 genera with 150 species, mainly tropical; 4 genera and 10 species in China.

Key to the Genera

Infl. terminal: stamens 10: fr. a samara..... 1. *Ailanthus*
Infl. axillary: stamens 4–5: fr. a drupe..... 2. *Picrasma*

1. **Ailanthus** Desf. Tree of Heaven 樗樹屬 (Ch'u Shu Shu)

Deciduous trees: lf. scars and lvs. the largest in our flora: lvs. having a disagreeable odor when bruised: lfts. 13–41, usually notched near the base: *infl.* in large *terminal* panicles; *stamens 10*; carpels 5–6, connate or free below, becoming *samaras*. 8–9 species, in eastern and southern Asia and northern Australia; 5 in China. (A Moluccan name, *ailante*, meaning Tree of Heaven.)

1. **Ailanthus altissima** (Mill.) Swingle Tree-of-Heaven 椿樹 (Ch'un Shu) (R.M. 531). Tree, to 20 m.; fls. greenish white, V–VI; fr. a samara, IX–X. China; locally in An., Che., Ki., Ku. Planted near dwellings. Fig. 202.

2. **Picrasma** Blume 苦樹屬 (K'u Shu Shu)

Deciduous trees or shrubs with very bitter properties: lfts. 7–15: *infl.* in loose

axillary cymes; *stamens 4–5*; carpels 2–5, becoming *drupe-like* in *fr.* 8 species, tropical and subtropical; 1 in China. (Greek: *picrasmos*, bitterness, referring to the bitter bark.)

1. **Picrasma quassioides** Benn. Asiatic Quassia 苦樹 (K'u Shu; Bitter Tree) (R.M. 531). Tree, to 10 m.; fls. V–VI; fr. drupe-like, IX; brts. with conspicuous yellow lenticels. Eastern Asia; locally in An., Che., Ki., Ku. Woodland. Fig. 203.

89. MELIACEAE Mahogany Family 楝科 (Lien K'o)

Trees or shrubs with *alternate* estipulate *bi-pinnate, or tri-pinnate lvs.* (ours): *fls.* mostly *perfect*; *stamens* usually more or less *united* into a tube at the base; ovary 2–5-celled (sometimes 10–20-celled): fr. a capsule, drupe or berry. About 40 genera with 600 species, tropical and subtropical; 10 genera and 20 species in China.

Key to the Genera

Lvs. odd-pinnate: fr. a capsule; seeds winged ..... 1. *Cedrela*
Lvs. bi- or tripinnate: fr. a drupe ..... 2. *Melia*

1. Cedrela Linn. 香椿属 (Hsiang Ch'un Shu)

Trees or shrubs with *pinnate lvs.*: *stamens 4–6*; ovary 5-celled, on a gynophore, becoming *a* 5-valved *capsule with many winged seeds.* 18 species, in tropical America, Asia and Australia; 3 in China. (From Cedrus, since the wood resembles that of Cedar.)

1. **Cedrela sinensis** Juss. 香椿 (Hsiang Ch'un; Fragrant Ailanthus) (R.M. 532). Tree, to 15 m.; fls. whitish, VI, stamens free; fr. a capsule, IX. China; locally in An.) Che., Ki., Ku. Temple forests. Fig. 204.

2. Melia Linn. Bead Tree 楝属 (Lien Shu)

Trees or shrubs with *2–3-pinnate lvs.*: fls. in axillary panicles: *stamens 10–12*; ovary 5–8-celled: *fr. drupaceous with a 5-celled stone*, and with 1 seed in each cell. 10 species, in southern Asia and Australia; 2 in China. (Old Greek name of the Ash.)

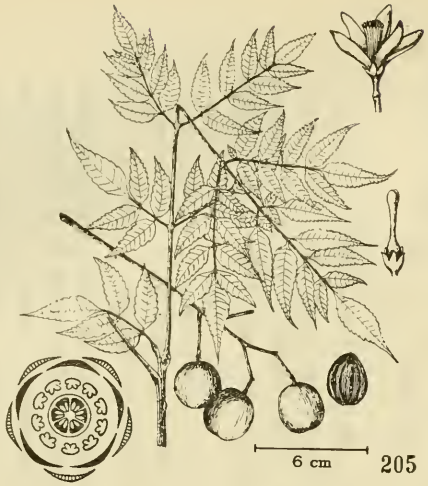
1. **Melia azedarach** Linn. China Berry 楝樹 (Lien Shu) (R.M. 533). Tree, to 15 m.; fls. fragrant, lilac, IV–V, stamens forming a tube; fr. a yellow drupe, VIII–IX. Himalayas; locally in An., Ki., Ku. Planted, ornamental. Fig. 205.

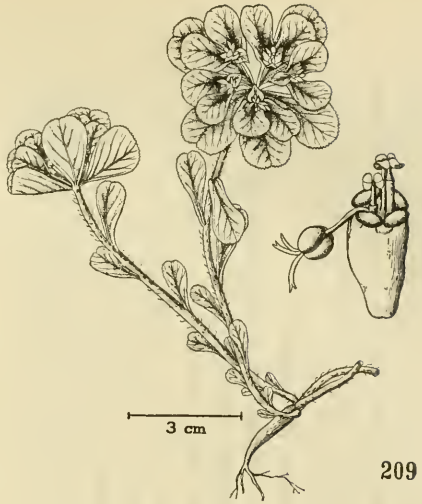
90. POLYGALACEAE Milkwort Family 遠志科 (Yüan Chih K'o)

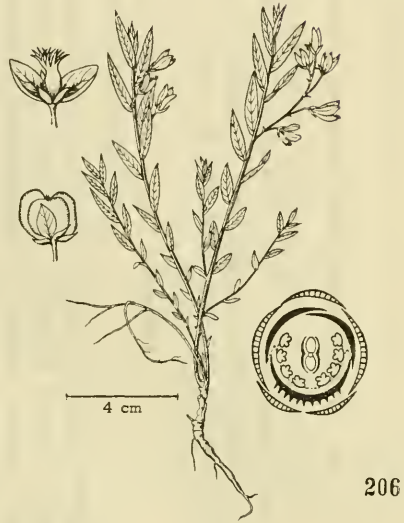
Herbs, shrubs or trees with *alternate entire simple* exstipulate *lvs.*: *fls.* perfect, irregular, subtended by 3 bracts: *stamens* borne *on a disc, alternating with the petals*; ovary 2-celled: fr. a capsule, nut or drupe. 11 genera and about 700 species, widely distributed; 3 genera and 15 species in China.

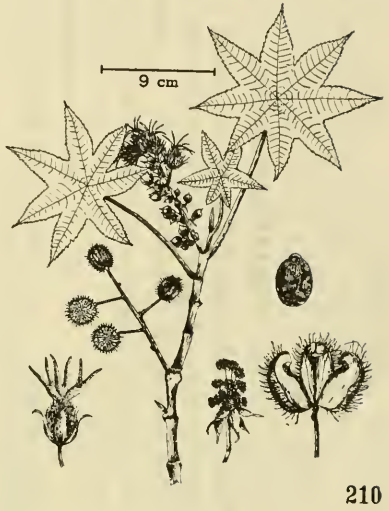
1. Polygala Linn. Milkwort 遠志属 (Yuan Chih Shu; Far-reaching-ambition Genus)

Erect herbs or shrubs: *sepals 5, the 2 inner larger* and petaloid (called wings); *petals* 3, joined below to the sheath of the stamens, *the lower one* keel-shaped and usually *crested*; *stamens 8, monadelphous*; anthers opening by pores: *fr. a* 2-celled, 2-seeded *capsule.* About 450 species, world wide; 12 in China. (Greek: *polys*, much: and *gala*, milk, since some species were supposed by Dioscorides to increase the flow of milk.)









205. Melia azedarach
206. Polygala tenuifolia

207. Aleurites fordii
208. Sapium sebiferum

209. Euphorbia helioscopia
210. Ricinus communis

Key to the Species

Lvs. orbicular, elliptic, oblong, ovate or lanceolate, 2–3.5 mm. long: fls. larger; lateral sepals (wings) 5–10 mm. long: plant usually 8–15 cm. high (sometimes to 40 cm.); brs. erect or ascending ..... 1. *P. japonica*

Lvs. narrow-linear, 10–45 mm. long: fls. smaller; lateral sepals (wings) 3–5 mm. long: plant 30–45 cm. high; brs. erect..... 2. *P. tenuifolia*

1. **Polygala japonica** Houtt. 瓜子金 (Kua Tzŭ Chin; Golden Water-melon Seeds) (H.F. 1:205). Suffrutescent, to 2 dm.; fls. bluish purple, IV–V; fr. VI–VIII. Eastern Asia; locally in An., Che., Hon., Ki., Ku. Woods and brushland.
2. **Polygala tenuifolia** Willd. (DC.P. 1:324). Suffrutescent, 3–4 dm. high; fls. V; fr. VI. Siberia, North China; locally in Ku. Grassland. Fig. 206.

91. **EUPHORBIACEAE** Spurge Family 大戟科 (Ta Chi K'o)

Herbs, shrubs or trees, often with *milky juice*: lvs. simple or compound, usually stipulate: infl. various: *fls. unisexual*; perianth simple or wanting; stamens few to many; *ovary* usually *3-celled*, the carpels united: fr. a capsule, berry, drupe or nut. 285 genera with 7,300 species, in all parts of the world, but more abundant in tropical regions; about 40 genera and over 130 species in China.

Key to the Genera

A. Plants woody.
  B. Lvs. trifoliolate: fr. berry-like ..... 1. *Bischofia*
  BB. Lvs. simple.
    C. Fr. a drupe.
      Fr. a large indehiscent drupe: deciduous ..... 2. *Aleurites*
      Fr. a small 1-seeded drupe: evergreen ..... 3. *Daphniphyllum*
    CC. Fr. a fleshy berry ..... 4. *Phyllanthus*
    CCC. Fr. a capsule.
      D. Capsules spiny or scaly (ours) ..... 5. *Mallotus*
      DD. Capsules glabrous or hairy, not spiny or scaly.
        E. Seeds normally 2 in each cell of the capsule.
          Capsules with persistent calyx at the base: seeds without aril.
            Lvs. lanceolate ..... 4. *Phyllanthus*
            Lvs. ovate; margins often recurved and crisped at maturity..... 6. *Securinega*
          Capsules not subtended by a persistent calyx; seeds with a red or orange-colored fleshy aril ..... 7. *Glochidion*
        EE. Seeds one in each cell of the capsule.
          Lvs. serrate (ours): style divided..... 8. *Alchornea*
          Lvs. entire: style undivided ..... 9. *Sapium*
AA. Plants herbaceous (except in *Euphorbia pulcherrima*): fr. capsular.
  Plants with latex: infl. conspicuously involucrate..... 10. *Euphorbia*
  Plants without latex.
    Lvs. large and palmately cleft: capsules large and echinate.. 11. *Ricinus*
    Lvs. small, pinnately veined or 3–5-nerved from the base: capsules small, smooth and bracteate ..... 12. *Acalypha*

1. **Bischofia** Blume 重陽木属 (Ch'ung Yang Mu Shu)

Deciduous or evergreen *dioecious tree* with watery sap and alternate *trifoliolate*

lvs.: infl. paniculate: fls. small, apetalous; stamens 5: *fr. berry-like*. One species, in tropical Asia. (In honor of G.W. Bischoff, a German botanist.)

1. **Bischofia javanica** Blume Tooo 重陽木 (Ch'ung Yang Mu; Double-heat Tree)* (Lee 704). Tree, to 20 m.; fls. white, IV–V; fr. brown, VIII–X, berry-like. Tropical Asia; locally in An., Che., Ki., Ku. Planted, ornamental.

*In connection with the festival held on the 9th day (heat of the sun) of the 9th month (heat of the moon.)

2. **Aleurites** Forst. 油桐屬 (Yu T'ung Shu)

Trees with latex and with *alternate simple lvs.*: usually *monoecious*: petioles with 2 glands at the top: infl. cymose: fls. conspicuous; stamens 8–20; ovary 2–5-celled, becoming in *fr. a large* leathery *drupe* with as many oil-bearing seeds. 6 species in Asia and Polynesia; 4 in China. (The Greek term meaning "mealy".)

1. **Aleurites fordii** Hemsl. Tung Oil Tree 桐油樹 (T'ung Yu Shu) (B.M. 620). Tree, to 10 m.; fls. reddish white, IV–V; fr. IX–X. Central Asia; locally in An., Che., Ki., Ku. Cultivated, fruit, ornamental. Fig. 207.

3. **Daphniphyllum** Blume 虎皮楠屬 (Hu P'i Nan Shu; Tiger-skin Machilus Genus)

Evergreen shrubs or small trees: dioecious: fls. apetalous, in axillary racemes; calyx small, 3–8 parted; stamens 5–18; styles 2, recurved: fr. a 1-seeded drupe. About 25 species in Asia; 11 in China. (Greek: *daphne*, laurel, and *phyllon*, leaf; referring to the shape of the leaves.)

Key to the Species

Calyx deciduous in fr.: lf. blades only faintly reticulate beneath ..... 1. *D. longistylum*
Calyx, at least the shallow cup, persistent in fr.: lf. blades strongly reticulate beneath ..... 2. *D. marchandii*

1. **Daphniphyllum longistylum** Chien (Sc. C. 8(1):239). Tree, to 10 m.; fls. V–VI; fr. VIII–IX. Central and western China; locally in An., Che., Hun., Hup., Ki. Moist woods.
2. **Daphniphyllum marchandii** (Lévl.) Croiz. & Metc. (L.S.J. 20(1):117–119). Shrub or tree, to 10 m.; fls. IV–V; fr. VII–X. Western and central China; locally in Hun., Hup. Thickets and woodland.

4. **Phyllanthus** Linn. 葉下珠屬 (Yeh Hsia Chu Shu)

Monoecious herbs, shrubs or trees with 2-ranked *alternate* entire *simple* stipulate *lvs.*: infl. in lateral panicles, or fls. solitary: *calyx persistent* in fr.; stamens 3–5; ovary 3–4-celled: *fr. a capsule or berry*. Over 400 species, in all warm regions; 10 species in China. (From the Greek terms meaning "leaf" and "flower", because in some species the flowers are borne on leaf-like brs.)

Key to the Species

a. Fr. a fleshy berry: lvs. broad, ovate.
Styles 8 ..... 1. *P. flexuosus*
Styles 3 ..... 2. *P. glaucus*

aa. Fr. a dry capsule.
Pistillate fls. on pedicels 1–2 mm. long: lvs. linear to oblong, tapering to base and tip ..... 3. *P. simplex*
Pistillate fls. sessile: lvs. rounded at the base and rounded or apiculate at the tip ..... 4. *P. urinaria*

1. **Phyllanthus flexuosus** (Sieb. & Zucc.) Muell.-Arg. (Chen 631). Shrub, to 5 m.; fls. IV–V; fr. black, fleshy, VII–IX. Eastern Asia; locally in An., Che., Ki., Ku. Woodland.
2. **Phyllanthus glaucus** Wall. ex Muell.-Arg. (*P. fluggeiformis* Muell.-Arg.) 青灰葉下珠 (Ch'ing Hui Yeh Hsia Chu; Gray-green Phyllanthus) (H.F. 5:288). Shrub, to 5 dm.; fls. IV; fr. fleshy. Eastern Asia; locally in An., Ki. Woodland.
3. **Phyllanthus simplex** Retz. 单葉下珠 (Tan Yeh Hsia Chu; Simple-leaved Phyllanthus) (M.F. 285). Erect herb, to 5 dm.; fls. on pedicels; fr. dry, IX–X. China, Malaya, Polynesia; locally in Ku. Woodland.
4. **Phyllanthus urinaria** Linn. 葉下珠 (Yeh Hsia Chu; Pearls-below-leaves) (Be. F. 310). Erect herb, to 5 dm.; fls. sessile; fr. dry, VIII. Tropical regions; locally in An., Che. Grassland.

5. **Mallotus** Lour. 野桐属 (Yeh T'ung Shu)

Shrubs or trees with *simple* often glandular *lvs.*: fls. apetalous, staminate in clusters, the pistillate solitary; stamens 20 or more; ovary 2–4-celled, becoming a *capsule*, often *spiny or scaly*, with as many seeds. About 80 species, in the eastern tropics; 15 in China. (Greek term meaning "wooly," referring to the pubescence of some species.)

Key to the Species

a. Frtg. infl. of separate single spike- or raceme-like clusters terminating small lfy. brs., sometimes with short brs. at the base.
b. Frtg. carpels conspicuously echinate; spines slender and flexuous; carpels and spines stellate-hairy, the carpels densely, so.
Lf. blades densely amber- or reddish-glandular and gray-stellate-tomentose beneath: seeds brown ..... 1. *M. apelta*
Lf. blades sparsely amber-glandular and glabrescent or with scattered stellate hairs beneath: seeds black ..... 2. *M. tenuifolius*
bb. Frtg. carpels crustaceous, brown-glandular and densely stellate-tomentose, not echinate; seeds dark brown or black .... 3. *M. repandus* var. *scabrifolius*

aa. Frtg. infl. definitely branching, usually with 2–several axes.
Lf. blades lanceolate, 3-nerved from the base, stellate-tomentose and red-amber glandular-dotted beneath: frtg. carpels encrusted with red glands ..... 4. *M. philippinensis*
Lf. blades sub-orbicular to rhombic-ovate, sparsely stellate-tomentose and with scattered amber glands beneath: frtg. carpels encrusted with amber glands ..... 5. *M. japonicus*

1. **Mallotus apelta** (Lour.) Muell.-Arg. (*M. paxii* Pamp.; *M. stewardii* Merr.) (E.P. 63:171; Pl.W. 2:525). Tree, to 5 m.; fls. whitish, VI; fr. VII–VIII. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
2. **Mallotus tenuifolius** Pax 野桐 (Yeh T'ung; Wild T'ung) (Di.F. 429). Tree, to

8 m.; fls. IX–X; fr. V–VII. China; locally in An., Che., Ki., Ku. Forest.

3. **Mallotus repandus** (Willd.) Muell.-Arg. var. **scabrifolius** (A.de Juss.) Muell.-Arg. (*M. illudens* Croiz.) (DC.P. 15(2):982). Climbing shrubs; fls. brownish, V; fr. brown, VII–VIII. Southeastern Asia; locally in An., Che., Ki. Thickets.
4. **Mallotus philippinensis** (Lam.) Muell.-Arg. 粗糠柴 (Ts'u K'an Ch'ai; Chaff-fuel) (M.F. 294). Evergreen tree, 4–10 m. high; fls. IV; fr. VIII. China, Philippines, Malaya; locally in An., Che. Thickets.
5. **Mallotus japonicus** (Thunb.) Muell.-Arg. 野梧桐 (Yeh Wu T'ung; Wild Firmiana) (Chen 619). Shrub or small tree; fls. VIII; fr. X. China, Japan; locally in Che., Ku. Bark and shoot used as medicine.

The writer has followed the conservative procedure of listing as distinct species only entities which he believes can be keyed from herbarium material and recognized in the field. This appears to be quite different from the view presented by Croizat in his discussion of certain species of *Mallotus* in his paper on "Chinese Euphorbiaceae" (AA. J. 19 (2): 134–148. 1938) where he remarks that, "The classification of staminate specimens of the two species (*M. apelta* and *M. paxii*) rests upon what may be called intangibles of habit, that is to say largely on the opinion of the individual taxonomist.....a narrow concept of taxonomic limits best serves the purpose of making generally available the data obtained by the study of herbarium specimens" (1. c. pp. 143–144). On another page Croizat comments, "*Mallotus repandus* intergrades with *M. illudens* through var. *scabrifolius*" (1. c. p. 148).

6. **Securinega** Juss. 一葉荻属 (I Yeh Ti Shu)

Deciduous shrubs with *alternate ovate* entire stipulate *lvs.*: *calyx persistent* in fr.: fls. small, axillary, apetalous; stamens usually 5; ovary 3-celled: *fr. a* dehiscent 3–6-seeded *capsule*. 10 species, in temperate and subtropical America, Eurasia, Africa; 2 in China. (Latin: *securis*, hatchet; and *negare*, to refuse, referring to the hard wood of some species.)

1. **Securinega suffruticosa** (Pall.) Rehd. (*S. fluggeoides* Muell-Arg.) 一葉荻 (I Yeh Ti; Single-leaf Reed) (R.M. 535). Shrub, to 2 m.; fls. VII–VIII; fr. VIII–IX. Northeastern Asia; locally in An., Che., Ki., Ku. Brushland.

7. **Glochidion** Forst. 饅頭果属 (Man T'ou Kou Shu)

Deciduous or evergreen *trees or shrubs* with *alternate entire* 2-ranked *lvs.*: fls. small, axillary, apetalous, *calyx deciduous*; anthers 3–8, joined in an oblong column; ovary 3–15-celled: fr. dry or fleshy: *seeds* often *with* a fleshy brightly colored *aril*. About 175 species, tropical Asia, Polynesia and Australia; 10 in China. (Greek: *glochis*, point; referring to the pointed anthers.)

Key to the Species

Brs. and lvs. more or less pubescent..... 1. *G. puberum*
Plant glabrous, or the petioles puberulent ..... 2. *G. wilsonii*

1. **Glochidion puberum** (Linn.) Hutchins. (*G. sinicum* Hook. & Arn.) 饅頭果 (Man T'ou Kou; Biscuit Fruit) (R.M. 535). Shrub, to 1 m.; fls. V; fr. VIII–IX. China, Formosa; locally in An., Che., Ki., Ku. Brushland.
2. **Glochidion wilsonii** Hutchins. (Pl.W. 2:518). Shrub or tree, to 8 m.; fls. greenish, VII–VIII; fr. VIII–IX. Central China; locally in An., Ki. Woodland.

8. **Alchornea** Sw. Dovewood 山麻桿屬 (Shan Ma Kan Shu; Mountain-fiber-pole Genus)

Dioecious, rarely monoecious, *pubescent trees or shrubs*: *lvs. alternate*, bright red when young, often glandular at the base: fls. apetalous; the staminate in dense oblong spikes; stamens 6 or more; the pistillate in loose racemes; *style divided*: ovary 2–4–celled: *fr.* a dehiscent *capsule*: *seeds* solitary in each cell, *without aril or waxy covering*. About 30 species, tropical; 4 in China. (Spanish: *alcornoque*, the name of a species of *Alchornea* used medicinally.)

1. **Alchornea davidii** Franch. 桂圓樹 (Kuei Yüan Shu; Osmanthus-ball Tree) (Chen 617). Shrub, to 3 m.; fls. V; lvs. serrate, red when young. Central China; locally in Ki., Ku. Planted, ornamental.

9. **Sapium** R. Br. 烏桕屬 (Wu Chiu Shu)

Monoecious deciduous glabrous trees or shrubs with latex: *lvs.* alternate, *entire* (ours); petiole usually with 2 glands at the top: infl. terminal: fls. apetalous, the staminate in 3's, the pistillate solitary, at the base of the infl.: stamens 2; *style undivided*; ovary 1–3–celled: fr. a capsule with 1 seed in each cell. About 100 species, tropical; 7 in China. (Latin: *Sa-pium*; classical name used by Pliny.)

Key to the Species

Lvs. ovate to lanceolate 4–15 cm. long: seeds at maturity not coated with white tallow.
- Petiole with 2 glands at junction with lamina; lamina light green beneath: capsule globose, about 8 mm. in diam.; seeds 4 mm. long, not mottled, attached lengthwise to the 3–winged column of the capsule ..... 1. *S. discolor*
- Petiole without 2 glands at the top; lamina dark green on both sides: capsule strongly 3–lobed, 15–18 mm. broad; seeds 6–9 mm. long, streaked with brown and dark purple at maturity, with narrow attachment ..... 2. *S. japonicum*

Lvs. rhombic-ovate, acuminate, 2.5–7 cm. broad, often as broad as long; petiole with 2 glands at junction with lamina; lamina pale green beneath: capsule 10–12 mm. long, globose to ellipsoid; seeds about 7 mm. long, at maturity coated with white tallow..... 3. *S. sebiferum*

1. **Sapium discolor** (Champ.) Muell.-Arg. (*Stillingia discolor* Champ.) (Be. F. 303). Shrub or tree, to 15 m.; fls. yellow, V–VI; fr. VIII–IX. Southeastern Asia; locally in An., Ki. Mountain forest.
2. **Sapium japonicum** (S. & Z.) Pax & Hoffm. 白乳木 (Pai Ju Mu; White-milk Wood) (Lee 713). Shrub, to 5 m.; fls. yellow, VI; fr. VII–VIII; seeds purple-streaked. Japan, Korea, China; locally in An., Che., Ki., Ku. Mountain woodland.
3. **Sapium sebiferum** (Linn.) Roxb. Candleberry Tree 烏桕樹 (Wu Chiu Shu; Black-tallow Tree) (B.M. 620). Tree, to 15 m.; fls. yellow, VI; fr. VIII–X. China, Japan; locally in An., Che., Ki., Ku. Woodland, planted, ornamental, wax. Fig. 208.

10. **Euphorbia** Linn. Spurge 大戟屬 (Ta Chi Shu)

Herbs or shrubs with *latex* and with *simple lvs.*: *infl.* of several staminate fls.

and 1 pistillate fl. *in perianth-like gland-bearing involucres* (cyathia) which often occur in clusters; staminate fls. of single stamens, and pistillate fl. a 3-celled ovary, both lacking floral envelopes: *fr. a capsule.* About 600 species, in all parts of the world; 25 in China. (Named after *Euphorbus*, a Greek physician to King Juba of Numidia.)

Key to the Species

a. Infl. not subtended by conspicuous bracts, or by colored lvs.: seeds oblong-tetragonous (Sect. *Chamaesyce*).
  Capsules glabrous: glands of the cyathium sessile or nearly so, oblong, bordered on the outside by a narrow white petal-like appendage with a 3-lobed or sub-entire margin: seeds brown, not wrinkled, finely granular, with mottled white-pustulate coat: delicate prostrate annual ..... 1. *E. humifusa*
  Capsules pubescent: glands of the cyathium stipitate, without petal-like appendages: seeds with 4–6 shallow transverse wrinkles, not coated.
    Cyathia on short axillary lfy. brts.: delicate prostrate annual: lvs. elliptic, oblong or ovate-lanceolate, 3–10 mm. long .... 2. *E. thymifolia*
    Cyathia in dense axillary terminal leafless glomerules: erect or decumbent annual: lvs. ovate to narrowly lanceolate, 10–40 mm. long ..... 3. *E. hirta*

aa. Infl. subtended by conspicuous bracts, or by colored lvs.
  b. Infl. subtended by white, yellow or red bracts or lvs.
    c. Plant a spiny shrub: brs. not strongly angled: cyathia closely subtended by two broadly ovate bright red bracts about 1 cm. across. (Sect. *Euphorbium*) ..... 4. *E. milii*
    cc. Plants not spiny, herbs or shrubs: the upper leaves red, pink or white, or blotched with red and white, or margined with white.
      Upper lvs. margined with white; a stout annual: glands of the cyathium with white petal-like appendages: capsule usually pubescent; seeds ovoid-globose, terete, gray, reticulate-tuberculate, 4 mm. long (Sect. *Petaloma*) ..... 5. *E. marginata*
      Upper lvs. red, pink or white, or blotched red and white: shrubs or herbs: glands of the cyathium without petal-like appendages: capsules glabrous or pubescent (Sect. *Poinsettia*)
        Upper lvs. uniformly red, pink or white, ovate-elliptical to lanceolate, 8–15 cm. long; a winter-flg. shrub, 0.5–3 m. high: cyathia with a single large yellow gland on one side ..... 6. *E. pulcherrima*
        Upper lvs. red at the base or blotched with red and white, variable in size, ovate, fiddle-shaped or linear; annual or biennial, 0.3–1 m. high: cyathia with one or two glands: seeds oblong-ovoid 3–4 mm. long, transversely wrinkled and tuberculate ..... 7. *E. heterophylla*
  bb. Infl. umbellate, subtended by a whorl of 4–6 oblong, spatulate, lanceolate or linear leaf-like herbaceous bracts; mostly erect stout herbs: glands of the cyathium without petal-like appendages (Sect. *Tithymalus*).
    d. Lvs. and bracts of the main umbel all obovate and broadly rounded or retuse at the apex, margins finely serrate;

annual, 5–40 cm. high: glands of the cyathium oval to oblong, short stipitate: capsule smooth; seeds brown, oval, sharply reticulate-pitted, 2 mm. long, with large yellow caruncle ..... 8. *E. helioscopia*

dd. Lvs. and bracts of the main umbel oblong, lanceolate or linear, margins entire.

e. Glands of the cyathium oval, recurved, up to 2 mm. long: bracts of the smaller units of the infl. in 3's, broadly ovate to almost orbicular, with prominent midrib: ovary and capsule coarsely glandular-verrucose: seeds smooth, light brown, ovoid to almost globular, about 2 mm. in diam.: perennial herb, 5–10 dm. high ..... 9. *E. pekinensis*

ee. Glands of the cyathium curved, lunate and 2-horned or crescent-shaped with long slender points: bracts of the smaller units of the infl. in pairs, sometimes unequal, reniform or triangular-lanceolate.

Upper bracts of the infl. reniform, often overlapping: glands of the cyathium lunate and 2-horned: perennial herbs, 5–40 cm. high, from elongated rhizomes.

Leaf-like bracts of the terminal umbel not abruptly dilated at the base; intermediate bracts of the compound umbel, when present, similar to the ultimate ones: capsule warty; seeds ellipsoid-ovoid, smooth, about 2 mm. long, with yellow emarginate caruncle ..... 10. *E. esula*

Leaf-like bracts of the terminal umbel abruptly dilated at the base; intermediate bracts of the compound umbel reniform, bifid, unequal, 2-radiate: capsule smooth or nearly so..... 11. *E. lunulata* var. *souchouensis*

Upper bracts of the infl. deltoid or triangular-lanceolate: glands of the cyathium dark red, curved, 2-horned: capsule smooth; seeds smooth; caruncle small and depressed: stout perennial, 20–50 cm. high, from a tough fibrous turbinate caudex ..... 12. *E. kansuensis*

1. **Euphorbia humifusa** Willd. 地錦草 (Ti Chin Ts'ao; Embroidered-carpet Herb) (Hegi 5(1):144). Prostrate herb; fls. VI–VII; fr. VII–IX. Northern Eurasia; locally in Ku. Field and garden weed.
2. **Euphorbia thymifolia** Linn. (G.H.C. 136:252). Prostrate annual; fls. VII–VIII; fr. VIII–IX. All tropical countries; locally in Ki. Sandy waste land.
3. **Euphorbia hirta** Linn. (M.F. 283). Erect or decumbent annual; fls. VII–VIII; fr. VIII–IX. All tropical countries; locally in Ki. Sandy banks.
4. **Euphorbia milii** Ch. des Moulins (*E. splendens* Bojer ex Hook.) Crown-of-Thorns 霸王鞭 (Pa Wang Pien; The-Great-King's-whip) (B.M. 617). Shrub, to 1.5 m.; fls. red, V. Introduced from Madagascar; locally in Ku. Planted, ornamental.
5. **Euphorbia marginata** Pursh (B.M. 618). Stout annual, 3 dm. high; fls. VIII. Introduced from North America; locally in Ku. Planted, ornamental.
6. **Euphorbia pulcherrima** Willd. ex Klotzsch Poinsettia 一品紅 (I P'in Hung; First-rank-red) (B.M. 618). Shrub, to 3 m.; fls. XII–I. Introduced from tropical America; locally in Ku. Planted, ornamental.

7. **Euphorbia heterophylla** Linn. Mexican Fire Plant 猩猩草 (Hsing Hsing Ts'ao; Ape Herb) (B.M. 618). Erect annual, to 1 m.; fls. VII–VIII. Introduced from the Americas; locally in Ku. Planted, ornamental.
8. **Euphorbia helioscopia** Linn. Sun Spurge 澤漆 (Tsê Ch'i; Glossy-paint) (G.M. 967). Succulent herb, to 4 dm.; fls. IV–V; fr. V–VI. Introduced from Europe; locally in An., Ku. Roadsides and field margins. Fig. 209.
9. **Euphorbia pekinensis** Rupr. Wartweed 大戟 (Ta Chi; Big-lance) (Mak.F. 375). Erect herb, 5–10 dm. high; fls. V–VIII; fr. VII–X. North China, Korea, Japan; locally in An., Ki., Ku. Grassland.
10. **Euphorbia esula** Linn. 乳漿草 (Ju Chiang Ts'ao; Milky-liquid Herb) (G.M. 968). Erect herb, to 30 cm.; fls. IV; fr. V; bracts of infl. reniform, yellow-green. Northern Eurasia; locally in An., Ku. Grassland.
11. **Euphorbia lunulata** Bunge var. **souchouensis** Hurusawa (J.J.B. 16:398). Erect perennial, 1–4 dm. high; fls. V–VI; fr. VI–VII. North China, Manchuria, Korea; locally in Ku. Grassland slopes.
12. **Euphorbia** aff. **kansuensis** J. Proch. 甘遂 (Kan Sui; Agreeable-length) (Bu. URSS VI. 21:203). Erect herb, to 0.8 m.; fls. IV–VI; fr. V–VIII. China; locally in Ku. Grassland.

Hurusawa's *Euphorbia formosana* Hayata var. *kiangsuensis* (Journ. Jap. Bot. 16 (1940) 579) is regarded by Croizat (1. c. 17 (1941) 578) as "a straight synonym" of *E. sampsoni* Hance. Croizat also states that "the northern Chinese plants (*E. pekinensis*) would seem to have constantly a larger seed than the southern ones (*E. sampsoni*), but they are unquestionably connected by numerous intermediates....." Neither *E. formosana* var. *kiangsuensis* or *E. sampsoni* has been separated here from *E. pekinensis* Rupr.

Croizat (1. c. 576) does not agree with Hurusawa (1. c. 16:456) in his assertion that "all the Asiatic plants known as *Euphorbia esula* belong to quite distinct species from the Linnaean *Euphorbia esula* in Europe." It has seemed best to retain the name *E. esula* for the plants formerly known under this heading.

Croizat (1. c. 17:574) regards Hurusawa's *Euphorbia lunulata* Bunge var. *souchouensis* (1. c. 16:398) as synonymous with Hemsley's *E. hippocrepica*. Handel-Mazzetti, in turn, considers *E. hippocrepica* to be identical with Hemsley's *E. erythraea* (Symb. Sin. 7:232). As to specimens from our area, we have not been able to separate these species described by Hemsley from *E. lunulata*.

11. **Ricinus** Linn. Castor Oil Plant 蓖麻属 (Pei Ma Shu)

A coarse erect monoecious *annual*, becoming a shrub or tree in tropical countries: *lvs. large, alternate*, peltate, *palmately lobed*: infl. in terminal panicles: fls. apetalous, the upper pistillate; stamens numerous; ovary 3-celled: *fr. an echinate capsule* with one seed to each cell. One species, widely distributed. (The Latin name.)

1. **Ricinus communis** Linn. Castor Oil Plant 蓖麻 (Pei Ma) (B.M. 621). Tree-like herb, to 5 m.; fls. VII–VIII; fr. IX–X. Introduced from tropical Africa; locally in Ku. Cultivated, medicinal, the seeds yield castor oil. Fig. 210.

12. **Acalypha** Linn. Copper-leaf 鉄莧菜属 (T'ieh Hsien Ts'ai Shu; Iron-Amaranth Genus)

Herbs (ours), shrubs or trees with *small alternate simple pinnately veined lvs.*: infl. in axillary spikes: pistillate fls. subtended by foliaceous bracts; stamens 8–many; ovary and *smooth capsule* 3-celled. About 300 species, tropical and subtropical; 5 in

China. (A Greek name for the nettle.)

1. **Acalypha australis** Linn. 榎草 (Chia Ts'ao; Herbaceous Catalpa) (Mak.F. 378). Herb, to 40 cm.; fls. VII–VIII; fr. IX–XI. Eastern Asia; locally in An., Ki., Ku. Grassland. Fig. 211.

92. BUXACEAE Box Family 黃楊科 (Huang Yang K'o)

Monoecious herbs, shrubs or trees with *watery sap* and simple estipulate lvs.: fls. apetalous; *stamens 4* or more; ovary 2–4–celled: fr. a capsule or drupe: sometimes combined with *Euphorbiaceae* from which it is separated by having the *raphe* of the pendulous ovule *turned away from*, not towards *the axis of the ovary*. 6 genera with 30–60 species, widely distributed in warm regions; 3 genera and 12 species in China.

Key to the Genera

Lvs. alternate, 3-nerved: fr. drupe-like ..... 1. *Sarcococca*
Lvs. opposite, penninerved: fr. a capsule, crowned by persistent styles .... 2. *Buxus*

1. Sarcococca Lindl. 野扇花属 (Yeh Shan Hua Shu; Wild Fan-flower Genus)

Evergreen glabrous shrubs with *alternate entire lvs.*: infl. axillary: stamens 4–6: *fr. drupe-like*, 1–2–seeded. 5–6 species, China and Malaysia; 3 in China. (Greek: *sarkos*, flesh; and *kokkos*, berry, referring to the fleshy fruit.)

1. **Sarcococca hookeriana** Baill. var. **digyna** Franch. (R.M. 536). Shrub, to 2 m.: fls. V–VI; fr. drupe-like, VIII–X. West China; locally in Ki. Forest.

2. Buxus Linn. Box 黃楊属 (Huang Yang Shu)

Evergreen shrubs or trees with *entire opposite lvs.*: stamens 4: fr. a 3–celled, 3–*horned capsule*, each cell with 2 seeds. About 30 species, in Europe, eastern Asia and tropical America; 6 in China. (The Latin name.)

1. **Buxus microphylla** Sieb. & Zucc. var. **sinica** Rehd. & Wils. 黃楊 (Huang Yang; Yellow Poplar) (R.M. 538). Shrub or tree, to 5 m.; fls. III–IV; fr. a 3–horned capsule, V–VII. China; locally in An., Ku. Planted, ornamental, wood. Fig. 212.

93. CALLITRICHACEAE Water Starwort Family 水馬齒科 (Shui Ma Ch'ih K'o)

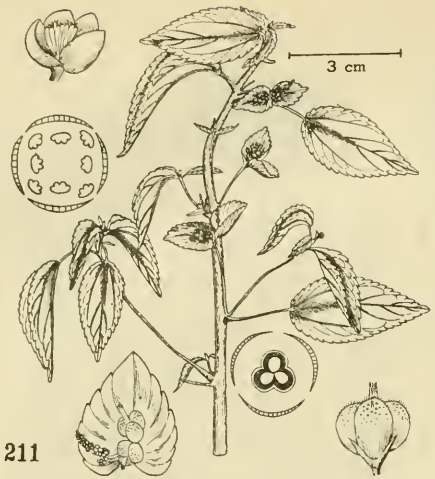
Herbaceous *aquatic* plants (rarely terrestrial), with capillary stems: *lvs. opposite*, estipulate, entire, in terminal rosettes (with spatulate blades): fls. very small, axillary, perfect or monoecious; perianth none; bracts 2, sac-like (or none); stamen one, with elongated filament; pistil one; ovary 4–celled; styles 2: fr. compressed; carpels winged, separating at maturity, one-seeded. Only the following genus.

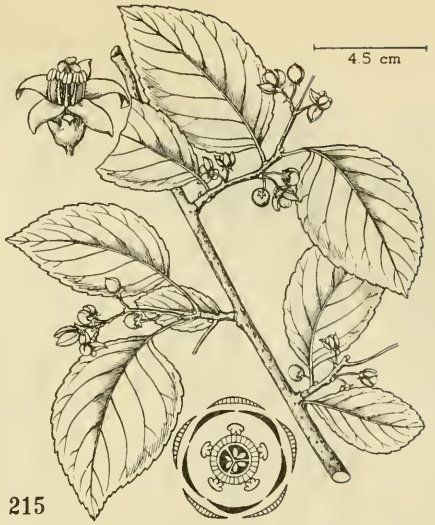
1. Callitriche Linn. Water Starwort 水馬齒属 (Shui Ma Ch'ih Shu)

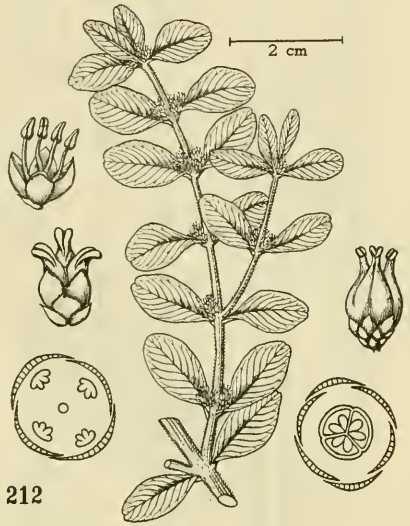
Characters of the family. About 20 species, widely distributed; 3 in China. (Greek meaning "beautiful" and "hair," referring to the hair-like stems.)

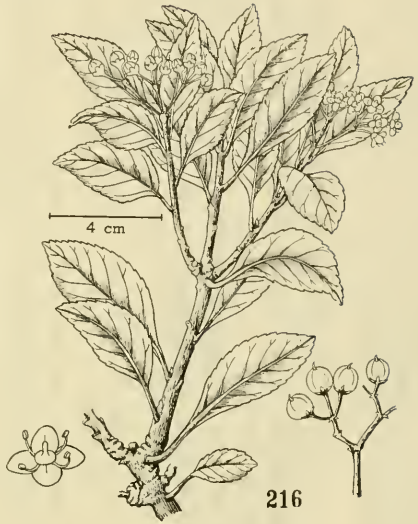
Key to the Species

Fr. wider than high, 2-lobed; reticulations scattered: stigmas 0.2–1.2 mm. long; anthers 0.1–0.2 mm wide (Sect. *Microcallitriche*) ..... 1. *C. japonica*









211. Acalypha australis
212. Buxus microphylla

213. Rhus verniciflua
214. Ilex chinensis

215. Celastrus angulata
216. Euonymus japonica

Fr. higher than wide, not at all or slightly lobed; reticulations apparently in more or less vertical lines: stigmas 0.7-6 mm. long; anthers 0.2-1.5 mm. wide. (Sect. *Callitriche*) ..... 2. *C. verna*

1. **Callitriche japonica** Engelm. (Mak.F. 374). Terrestrial herb; fls. V; fr. VI. Japan, China; locally in Ku. Moist banks.
2. **Callitriche verna** Linn. emend. Kütz. 水馬齒 (Shui Ma Ch'ih; Water Purslane) (Rh. 53:166). Aquatic herb; fls. V; fr. VI. Eurasia, North America; locally in Ku. Ponds and lakes.

94. ANACARDIACEAE Cashew Family 漆樹科 (Ch'i Shu K'o)

Trees or shrubs with resinous bark and often with latex: *lvs. alternate* estipulate: infl. in panicles: fls. small, unisexual, polygamous or perfect; stamens usually 5 or 10, inserted at the edge of a disc; styles 1–5; *carpels* 1 or 3–5, *united* (ours) into a compound ovary, or free: fr. a 1–5–celled, 1–5–seeded drupe or nut. About 75 genera with 600 species, mostly tropical and subtropical; 10 genera and 30 species in China.

Key to the Genera

Lvs. simple, rounded or emarginate at the apex: fls. with petals: frtg. panicles with scattered drupes in a profusion of long plumose sterile pedicels ..... 1. *Cotinus*

Lvs. pinnately compound: frtg. panicle without plumose pedicels.

Fls. apetalous: drupes green, red and purple in the same frtg. panicle: lfts. entire, 10-12 per lf ..... 2. *Pistacia*

Fls. with petals: drupes green or yellowish, not multi-colored: lfts. often serrate ..... 3. *Rhus*

1. Cotinus Adans. 黃櫨屬 (Huang Lu Shu; Yellow-plumy-shrub Genus)

Polygamous or dioecious deciduous shrubs or small trees with yellow wood and strong-smelling juice: *lvs.* alternate, *simple*, ovate, oval or obovate, entire or emarginate, on slender petioles, without stipules: fls. in spreading panicles, small, yellowish or greenish, on slender elongating pedicels which are clothed with spreading hairs; sepals, petals and stamens 5; petals oblong, 2 x the lance-ovate sepals; stamens shorter than the petals; ovary superior: fr. a dry obliquely obovoid drupe: *frtg. panicles with* the *elongated plumose pedicels* of many sterile fls. 2 species, one in North America and one in Eurasia. (Ancient Greek name of the wild olive.)

1. **Cotinus coggygria** Scop. Smoke-Tree (R.M. 541). Bushy shrub, to 5 m.; fls. purplish, V–VI; fr. VI–VII. Eurasia; locally in An., Che., Ku. Planted, ornamental.

2. Pistacia Linn. 黃連木屬 (Huang Lien Mu Shu)

Dioecious trees or shrubs with simple or compound lvs. and *apetalous fls.*: stamens 3–5; style 3–parted: *fr.* dry, obliquely *ovoid.* 8 species, in southern North America and Eurasia; 2 in China. (The Latin name, derived from the Greek name *pistake.*)

1. **Pistacia chinensis** Bunge 黃連木 (Huang Lien Mu; Woody Coptis) (R.M. 540). Tree, to 25 m.; fls. apetalous, IV; fr. X–XI. China; locally in An., Che., Ki., Ku. Woodland.

3. **Rhus** Linn. Sumac 漆樹屬 (Ch'i Shu Shu)

Shrubs or trees with simple or compound lvs. and *petalous* dioecious or polygamous *fls.*: stamens 5; styles 3: *fr.* usually *compressed.* 150 species, subtropical and temperate; 13 in China. (The old Greek name.)

Key to the Species

a. Lfts. serrate: infl. terminal: fr. red, hairy and glandular (Sect. *Sumac*).
  Rachis of the lf. winged: fls. creamy-white ..... 1. *R. chinensis*
  Rachis of the lf. terete: fls. greenish..... 2. *R. typhina*
aa. Lfts. entire: infl. axillary: fl. yellowish or greenish (Sect. *Toxicodendron*).
  b. Fr. hispid; exocarp soon separating and falling off at maturity exposing the white endocarp: lfts. 13-17, pubescent beneath. 3. *R. trichocarpa*
  bb. Fr. glabrous; exocarp not separating: lfts. 7-15.
    Lfts. pubescent beneath, ovate to oblong-ovate: brts. and rachis pilose when young.
      Lfts. to 12 cm. long: veins 18-25 prs., 5 mm. or less apart: fr. brownish yellow ..... 4. *R. sylvestris*
      Lfts. to 16 cm. long: veins 8-16 prs., over 5 mm. apart: fr. straw yellow..... 5. *R. verniciflua*
    Lfts. glabrous, elliptic-lanceolate: brs. and rachis glabrous .. 6. *R. succedanea*

1. **Rhus chinensis** Mill. (*R. semialata* Murr., *R. javanica* Thunb., not Linn. 塩膚木 (Yen Fu Mu; Salt-bark Wood) (R.M. 543). Shrub or tree, to 8 m.; fls. VIII–IX; fr. X. China, Japan, Hawaiian Islands; locally in An., Che., Ki., Ku. Brushland and woodland.
2. **Rhus typhina** Linn. Staghorn Sumac (R.M. 542). Shrub or tree, to 10 m.; fls. VI–VII; fr. VIII–IX; lfts. serrate. Introduced from eastern North America; locally in Ku. Planted, ornamental.
3. **Rhus trichocarpa** Miq. 毛漆樹 (Mao Ch'i Shu; Hairy Varnish-tree) (R.M. 543). Shrub or tree, to 8 m.; fls. V–VI; fr. hairy, VII–VIII. Japan, China; locally in An., Che., Ki. Brushland and woodland.
4. **Rhus sylvestris** Sieb. & Zucc. 野漆樹 (Yeh Ch'i Shu; Wild Varnish-tree) (R.M. 544). Tree, to 10 m.; fls. V–VI; fr. IX–X. China, Japan, Korea; locally in An., Ki., Ku. Woodland and forest.
5. **Rhus verniciflua** Stokes (*R. vernicifera* DC.) Varnish Tree 漆樹 (Ch'i Shu) (R.M. 544). Tree, to 20 m.; fls. V–VII; fr. VIII-X. Japan, China, Himalayas; locally in Ki., Ku. Woodland, forest. Fig. 213.
6. **Rhus succedanea** Linn. Wax Tree 木蠟樹 (Mu La Shu) (R.M. 544). Tree, to 10 m.; fls. V; fr. X. Southern and eastern Asia; locally in An., Che., Ku. Woodland.

95. **AQUIFOLIACEAE** Holly Family 冬青科 (Tung Ch'ing K'o)

Trees or shrubs, usually dioecious, with *alternate simple lvs.* and small *axillary* regular *fls.*: *stamens* 4–5, *free*; *disk wanting*; ovary 3–many-celled: fr. a berry-like drupe. 3 genera and over 300 species, temperate and tropical; one genus and 50 species in China.

1. **Ilex** Linn. Holly 冬青屬 (Tung Ch'ing Shu)

Lvs. often with spiny teeth: *petals broad, joined at the base*; *sepals persistent.*

About 300 species; 50 in China. (The old Latin name of *Quercus Ilex*.)

Key to the Species

a. Lvs. evergreen, coriaceous or chartaceous; margins serrate, crenate, emarginate or entire: brs. all elongated.
  b. Lve. with coarse spiny teeth, spiny-serrate, or if entire with an apical spine: fr. red.
    Fls. and frs. on pedicels 3-12 mm. long: lf. blades 2.5-8 cm. long, oblong-rectangular with 4-6 spines, or with apical spine ..... 1. *I. cornuta*
    Fls. and frs. on pedicels 2-3 mm. long or nearly sessile.
      Lf. blades rhombic or triangular-ovate 1.5-4 cm. long; margins with 3-5 spine-tipped lobes: shrub or small tree: frs. in pairs, 7-8 mm. in diam.; pyrenes woody, palmately striate on the back ..... 2. *I. pernyi*
      Lf. blades lanceolate, oblanceolate or ellipsoid, 6-12 cm. long; margins spiny-serrate, spiny teeth less developed on older brs.: tree, to 10 m. high: frs. in fascicles, 10-12 mm. in diam.; pyrenes stony, pitted..... 3. *I. hynoloma*
  bb. Lvs. serrate, crenate or entire, not spiny.
    c. Lvs. with regularly serrate or crenate margins.
      d. Fls. and frs. in clusters of 1 to several on peduncles 5-15 mm. long: lvs. lanceolate-acuminate.
        e. Fr. red, clustered; pyrenes with a deep dorsal canal; lvs. not punctate.
          Fr. elliptic, red, in clusters near the ends of the brs.: lf. blades 3-8 cm. long; margins crenate-serrate ..... 4. *I. chinensis*
          Fr. subglobose, red or brownish red, in clusters of 2 or 3 to a peduncle; clusters scattered in the lf. axils of the season's growth: lf. blades 5-10 cm. long; margins serrate... 5. *I. suaveolens*
        ee. Fr. black, solitary and axillary, on stout 1-fld. peduncle; pedicels 5-10 mm. long; pyrenes smooth on the back; lvs. ovate, obovate or elliptic, canaliculate above, glabrous, glossy above, dull and punctate beneath, 2-5 cm. long; margins serrate, with minute sharply pointed teeth ..... 6. *I. viridis*
      dd. Fls. and frs. on short pedicels or nearly sessile, not pedunculate or on very short peduncles: lvs. oblong, elliptic, ovate or lanceolate, coriaceous, chartaceous or membranous: fr. globose or subglobose.
        f. Lvs. large, 5-18 cm. long, oblong to ovate, rounded, obtuse or briefly acute at tip, serrate with recurved margins, pale beneath: fr. brown or reddish..... 7. *I. latifolia*
        ff. Lvs. small, 2-6 cm. long, ovate to lanceolate, acute or caudate at tip, serrate: fr. red, globose.
          Trees, 12-15 m. high: lvs. thick-coriaceous, with caudate tips; blades glabrous or

nearly so: fr. 4.5-6 mm. in diam.
Brts. and petioles puberulent: individual brs. of the flg. fascicle 1-fld. ..... 8. *I. buergeri*
Brts. and petioles glabrous: individual brs. of the staminate flg. fascicle 3-fld.... 9. *I. formosana*
Shrub, to 3 m. high: lvs. chartaceous or membranous, obtuse, acute or caudate at tip; blades pubescent: fr. 4 mm. in diam ..... 10. *I. pubescens*

cc. Lvs. with margins entire or nearly so.
g. Lvs. notched or emarginate at the tip; blades otherwise entire, obovate to lanceolate, 1-3.5 cm. long, coriaceous: brts. and midnerve of lf. pubescent: calyx lobes short-fimbriate-hairy in fr.: frs. in pairs, globose, on very short pedicels, about 3 mm. in diam..... 11. *I. lohfauensis*
gg. Lvs. with margins entire or very nearly so: frs. solitary or in simple cymes.
h. Fls. and frs. in pedunculate clusters: lvs. ovate, lanceolate or elliptic; tips caudate or acute.
Flg. and frtg. peduncles 12-20 mm. long, bearing 1-3 subglobose frs. 7-8mm. in diam. pedicels glabrous: lvs. 4-7 cm. long; irregularly serrate, occasionally crispy-wavy..... 12. *I. pedunculosa*
Flg. and frtg. peduncles 2-10 mm. long, bearing 2-5 ellipsoid frs. 4-7 mm. in diam.; pedicels pubescent: lvs. 4-8 cm. long; margins entire 13. *I. rotunda*
hh. Fls. (at least the pistillate) and frs. not pedunculate: lvs. ovate, elliptic or lanceolate; tips caudate or acute: plants glabrous: stigmas persistent in fr.
Stigma thickly discoid in fr.; lvs. ovate to lanceolate, abruptly caudate; blades 2.5-6×1-3.3 cm. ..... 14. *I. wilsonii*
Stigma columnar in fr., 1.2 mm. long; lvs. ovate, elliptic or lanceolate, abruptly acute; blades 2-8×3.5 cm. ..... 15. *I. elmerrilliana*

aa. Lvs. deciduous, chartaceous or membranous; margins serrate or crenate-serrate: short shoots or spurs characteristic of some species: staminate fls. in peduncled clusters (Subgenus *Prinos*).
i. Pistillate fls. (and frs.) solitary, on slender pedicels 12-25 mm. long; mature fr. black or dark purple.
Fr. small, 5-7 mm. in diam., longitudinally ridged; pyrenes 4-6: lvs. membranous, ovate or lanceolate blades 2-5 cm. long, caudate or acuminate at tip ..... 16. *I. asprella*
Fr. large, 12-20 mm. in diam.: pyrenes 7-9: lvs. chartaceous, elliptic or ovate; blades 6-14 cm. long, acute or acuminate at tip ..... 17. *I. macrocarpa*
ii. Pistillate fls. and frs. clustered, on short pedicels up to 8 mm. long: mature fr. red.
j. Infl. a trichotomous cyme: fr. globular, 2-3 mm. in diam., densely clustered near tip of the current season's growth: lvs. chartaceous, ovate or elliptic, 5-10 cm. long, acuminate at tip ..... 18. *I. micrococca*

jj. Infl. fascicled or solitary, not trichotomous.

Lvs., fls. and frs. mostly at the tips of stout short shoots or spurs: frs. red at maturity, 4-6 mm. in diam., on stout pedicels 4-8 mm. long, 2-8 on a spur; lvs. chartaceous, ovate or broadly elliptic, 5-8 cm. long.. 19. *I. macropoda*

Lvs. fls. and frs. on very short spurs scattered along the brs.: frs. black at maturity, 4-5 mm. in diam., in clusters of 2-5, nearly sessile or on pedicels up to 5 mm. long: lvs. and brts. pubescent; blades membranous, pubescent, obovate to lanceolate, obtuse, acute or acuminate at tip, 1.5-4 cm. long ..... 20. *I. aculeolata*

1. **Ilex cornuta** Lindl. & Paxt. Chinese Holly 枸骨 (Kou Ku; Bony Barb) (R.M. 546). Shrub or tree, to 12 m.; fls. IV–V; fr. red, IX–XII; pedicels about 1 cm. long. Eastern China; locally in An., Che., Ki., Ku. Woodland.
2. **Ilex pernyi** Franch. (R.M. 548). Shrub or tree, to 8 m.; fls. V; fr. red, X. central and western China; locally in An., Ki. Woodland.
3. **Ilex hynoloma** Hu & Tang (AA.J. 30:351). Tree, to 10 m.; fr. red, X. China; locally in Che., Hun. Woodland.
4. **Ilex chinensis** Sims (*I. purpurea* Hassk.; *I. oldhami* Miq.) 冬青 (Tung Ch'ing; Winter Green) (AA.J. 30:299). Tree, to 20 m.; fls. reddish purple, VI; fr. red, X–XII. China, Japan; locally in An., Che., Ki., Ku. Forest. Fig. 214.
5. **Ilex suaveolens** (Lévl.) Loes. (AA.J. 30:296). Tree, to 12 m.; fr. red, X–XII, 2–3 on slender peduncle. China; locally in An., Che., Ki. Forest.
6. **Ilex viridis** Champ. ex Benth. (Be.F. 65). Shrub or tree, to 5 m.; fr. black, X–XII. South China; locally in An., Che., Ki. Woodland shade.
7. **Ilex latifolia** Thunb. 菠蘿樹 (Po Lo Shu; Pineapple Tree) (R.M. 549). Tree, to 20 m.; fr. XI–XII. Japan, China; locally in An., Che., Ki., Ku. Forest.
8. **Ilex buergeri** Miq. (AA.J. 31:57). Tree, to 15 m.; fls. yellowish green, IV–V; fr. red, X–XI. Japan, China; locally in Che., Hun. Evergreen forest.
9. **Ilex formosana** Maxim. (AA.J. 31:68). Tree, to 12 m.; fls. greenish, IV; fr. red, X. South China, Philippines; locally in An., Che., Ki., Hun. Forest.
10. **Ilex pubescens** Hook. & Arn. (AA.J. 31:220). Shrub, to 3 m.; fls. pink or purple, V; fr. red, X; brts. and lvs. pubescent. China; locally in An., Che., Ki. Woodland.
11. **Ilex lohfauensis** Merr. (AA.J. 31:260). Shrub, to 2 m.; fls. green and lavendar, VI–VII; fr. brown, X. South China; locally in An., Che., Ki. Evergreen undergrowth.
12. **Ilex pedunculosa** Miq. (R.M. 549). Shrub or tree, to 10 m; fls. white, VI; fr. red, X. Japan, South China; locally in An., Che., Ki. Woodland shade.
13. **Ilex rotunda** Thunb. 鉄冬青 (T'ieh Tung Ch'ing; Black Ilex) (R.M. 549). Tree, to 20 m.; fls. creamy white, IV–V; fr. red, IX–X. Japan, Korea, China; locally in An., Che., Ki., Ku. Forest.
14. **Ilex wilsonii** Loes. (AA.J. 31:252). Shrub or tree, to 10 m.; fls. white, VI; fr. red, IX–X. South China; locally in An., Che., Ki. Forest.
15. **Ilex elmerrilliana** S.Y. Hu (AA.J. 31:229). Shrub or tree, to 5 m.; fls. VI; fr. X. South China; locally in An., Che., Ki. Evergreen thickets.
16. **Ilex asprella** (Hook. & Arn.) Champ. ex Benth. (AA.J. 30:269). Deciduous shrub, to 3 m.; fls. white, IV; fr. black, VIII. South China; locally in Che., Ki. Brushland.

17. **Ilex macrocarpa** Oliv. 青皮 (Ch'ing P'i; Green Bark) (R.M. 552) Deciduous tree, to 10 m.; fls. white, IV–V; fr. black, X–XI. South, central and western China; locally in An., Che., Hun., Ki., Ku. Woodland.
18. **Ilex micrococca** Maxim. (R.M. 550). Deciduous tree, to 20 m.; fls. VI; fr. red, X–XI. South China, Japan; locally in Che., Ki. Woodland.
19. **Ilex macropoda** Miq. (*I. dubia* Britt. var. *pseudomacropoda* Loes.; *I. montana* Torr. & Gray var. *macropoda* (Miq.) Fern.) (R.M. 552). Shrub or tree, to 10 m.; fls. V–VI; fr. red, IX–XI. Japan, China, Korea; locally in An., Che., Ki. Forest.
20. **Ilex aculeolata** Nakai (AA.J. 30:277). Deciduous shrub, to 2 m.; fls. white, V; fr. black, IX. Central and south China; locally in Hun., Ki. Forest.

96. CELASTRACEAE Staff Tree Family 衛矛科 (Wei Mao K'o)

Shrubs or trees, often climbing, with *simple* stipulate *lvs.* and small regular fls.: stamens 5–10; *disk present*; ovary 3–5-celled: *fr. a capsule* with 2 usually arillate seeds in each cell. 45 genera with 500 species, temperate and tropical regions; 8 genera and over 100 species in China.

Key to the Genera

Lvs. alternate: infl. terminal.
- Fr. a 1-seeded nutlet, 3-winged; seeds without aril ..... 1. *Tripterygium*
- Fr. a capsule; seeds with fleshy crimson aril ..... 2. *Celastrus*

Lvs. opposite: infl. axillary ..... 3. *Euonymus*

1. Tripterygium Hook. f. 雷公藤属 (Lei Kung T'êng Shu; God-of-Thunder Vine)

Deciduous glabrous scandent shrubs with *alternate lvs.* and small polygamous fls.; *infl. terminal*: stamens 5: *fr. a* 3-winged 1-seeded *nutlet*; *seeds without aril*. 3 species in eastern Asia; one in China. (Greek: *tri*, three, and *pterex*, *pterygos*, wing; referring to the 3-winged fruit.)

1. **Tripterygium wilfordii** Hook. f. (*T. forrestii* Loes.) 昆明山海棠 (K'un Ming Shan Hai T'an; Kunming Mountain Crabapple) (Ed.N. 8(36):4; Bo.Ma. 160, T. 9488). Woody vine; fls. creamy white, VI–VII; fr. IX–X; axes of infl. ferrugineous-pubescent. China; locally in An., Che., Hun., Ki. Thickets.

2. Celastrus Linn. Staff Tree 南蛇藤属 (Nan Shê T'êng Shu)

Shrubs, usually deciduous and climbing, with *alternate petiolate lvs.* and polygamo-dioecious 5-merous fls.: *infl. terminal*: stamens 5: *capsule* usually yellow, breaking into 3 valves each with 1 or 2 seeds; seeds with *crimson aril*. Over 30 species, in Asia, Australia, America; 20 in China. (*Kelastros*, old Greek name of an evergreen tree, probably *Ilex Aquifolium*.)

Key to the Species

Fls. in terminal panicles: brts. angular: lvs. 10–18 cm. long ..... 1. *C. angulata*

Fls. in axillary cymes: brts. terete: lvs. 5–12 cm. long.
- Winter buds 7–10 mm. long: lvs. elliptic: fr. 10–12 mm. across ..... 2. *C. gemmata*
- Winter buds smaller: lvs. ovate to oblong-ovate: fr. about 8 mm. across .. 3. *C. orbiculata*

1. **Celastrus angulata** Maxim. 苦樹皮 (K'u Shu P'i; Bitter Bark) (R.M. 561). Climb-

ing shrub; fls. V–VI; fr. (red aril) in terminal clusters, X–XI. Eastern Asia; locally in An., Hup. Thickets. Fig. 215.

2. **Celastrus gemmata** Loes. (R.M. 562). Climbing shrub; fls. V–VI; fr. axillary, IX–X. Central and western China; locally in An., Che., Ki., Ku. Thickets.
3. **Celastrus orbiculata** Thunb. (*C. articulata* Thunb.) 南蛇藤 (Nan Shê T'êng; Southern Snake-vine) (R.M. 562). Climbing shrub; fls. greenish, IV–V; fr. orange, (red aril) axillary IX–X. Japan, China; locally in An., Hun., Ki., Ku. Thickets.

Celastrus articulata (Thunb. Fl. Jap. (1784) 97) is now shown to be a typographical error. The correct name, as intended by Thunberg, appears in the systematic list at the beginning of the volume, p. xlii, *C. orbiculata*. For explanation of this case, and of the use of the masculine ending of the species name, since the genus name was transferred from the Greek by Linnaeus in that form, see discussion by H. K. Airy Shaw in Bot. Mag. 158 (1935) t. 9394.

3. **Euonymus** Linn. Spindle Tree 衛矛屬 (Wei Mao Shu)

Shrubs, sometimes climbing vines, or small trees, usually with *opposite lvs.* and perfect fls.: *infl. axillary*: *capsule* sometimes winged; seeds with *orange aril.* 120 species, in North America, Eurasia and Australia; 75 in China. (The old Greek name.)

Key to the Species

a. Fl. divided into separate pods or lobed.
  b. Fr. divided nearly to the base into 4 separate pods, sometimes reduced to 1-3: brts. usually with broad corky wings (except f. *aptera*) ..... 1. *E. alata*
  bb. Fr. 4-lobed: brts. without corky wings.
    Fls. large, 2 cm. across, whitish: frtg. peduncles 4-6 cm. long: seeds black; aril scarlet..... 2. *E. grandiflora*
    Fls. small, not over 1 cm. across, yellowish; frtg. peduncles 1-3 cm. long: seeds brown, white or pinkish; aril orange.
      Lvs. acute; petioles less than 5 mm. long: seeds brown.. 1.a. *E. alata* f. *aptera*
      Lvs. acuminate; petioles 8-25 mm. long: seeds white or pinkish..... 3. *E. bungeana*
aa. Fr. subglobose.
  c. Lvs. deciduous, ovate to ovate-oblong, acuminate, 4-8 cm. long; margins serrulate, with incurved mucronate teeth: peduncles of the infl. long and slender..... 4. *E. oxyphylla*
  cc. Lvs. evergreen.
    Cymes loose, 5-7 cm. across; fls. about 8 mm. in diam..... 5. *E. kiautschovica*
    Cymes rather dense: fls. smaller, not over 5 mm. in diam.
      Lf. blades obtuse at apex: brs. slightly angled: erect shrub or small tree..... 6. *E. japonica*
      Lf. blades acute at apex: brs. terete: procumbent or climbing shrub ..... 7. *E. fortunei*

1. **Euonymus alata** (Thunb.) Sieb. Winged Spindle-tree 衛矛 (Wei Mao; Protecting Javelin) (R.M. 554). Shrub, to 3 m.; fls. IV–VI; fr. IX–X, with orange aril. Japan, Korea, Manchuria, China; locally in An., Che., Hun., Hup., Ki., Ku. Thickets, woodland.

1a. **Euonymus alata** (Thunb.) Sieb. f. **aptera** (Reg.) Rehd. (R.M. 554) (*E. a. β aptera*

Regel) Brs. not or slightly winged: laxer in habit than the typical form.

2. **Euonymus grandiflora** Wall. 大花衛矛 (Ta Hua Wei Mao) (R.M. 558). Shrub or tree, to 10 m.; fls. white, VII; fr. IX, with scarlet aril. Himalayas, China; locally in An., Che., Ki., Ku. Forest.
3. **Euonymus bungeana** Maxim. 絲綿木 (Ssŭ Mien Mu; Silk-wadding Wood) (R.M. 557). Shrub or tree, to 6 m.; fls. V–VI; fr. X, with orange aril, open at apex. Central and north China, Manchuria; locally in An., Che., Ki., Ku. Thickets, woodland.
4. **Euonymus oxyphylla** Miq. (R.M. 558). Shrub or tree, to 8 m.; fls. greenish brown, V; fr. dark red, IX. Japan and China; locally in An., Che. Forest.
5. **Euonymus kiautschovica** Loes. 攀緑絲棉木 (P'an Yuan Ssŭ Mien Mu; Climbing Silk-wadding Tree) (R.M. 558). Shrub, sometimes climbing; fls. white, 8 mm. in diam., VII–VIII; fr. X–XII. Eastern and central China; locally in An., Ki., Ku. Woodland.
6. **Euonymus japonica** Thunb. 大葉黃楊 (Ta Yeh Huang Yang; Large-leaved Buxus) (R.M. 558). Shrub or tree, to 8 m.; fls. VI–VIII; fr. X, with orange aril. Introduced from Japan; locally in An., Ku. Planted, ornamental.
7. **Euonymus fortunei** (Turcz.) Hand.-Mazz. 扶芳藤 (Fu Fan T'êng; Supporting-fragrant Vine) (R.M. 559). Climbing shrub; fls. V; fr. X. Central China; locally in An., Che., Ki., Ku. Woodland.

97. STAPHYLEACEAE Bladdernut Family 省沽油科 (Shêng Ku Yu K'o)

Deciduous trees or shrubs with opposite *pinnate* stipulate *lvs.* and perfect *regular fls.*: infl. in panicles: stamens 5, at the edge of a disk; ovary 3–1–celled: fr. a capsule or pod with 1–few seeds in each cell. 6 genera with about 25 species, of north temperate regions: 4 genera and 6 species in China.

Key to the Genera

Fr. a leathery pod; seeds with a thin aril: lfts. 7–11 ..... 1. *Euscaphis*
Fr. an inflated capsule; seeds without aril: lfts. 3–7 ..... 2. *Staphylea*

1. Euscaphis Sieb. & Zucc. 野鴉椿属 (Yeh Ya Ch'un Shu)

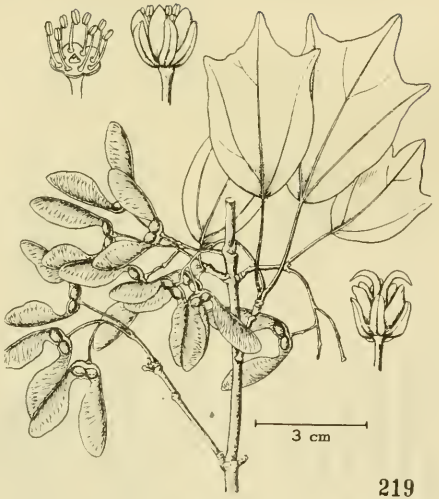
Glabrous shrub or small tree with *opposite lvs.*: fr. of 1–3 *leathery pods*, each with 1–3 *arillate seeds*. One species, in eastern Asia. (Greek: *eu*, well, and *scaphis*, vessel; referring to the shape of the dehiscent pod.)

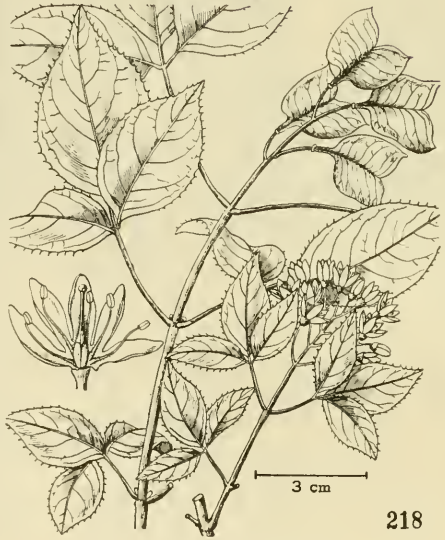
1. **Euscaphis japonica** Dipp. 野鴉椿 (Yeh Ya Ch'un; Wild-duck Ailanthus) (R.M. 565). Shrub or tree, to 8 m.; fls. greenish white, V–VI; fr. red, VIII–IX. Japan, Central China; locally in An., Che., Ki., Ku. Woodland, forest. Fig. 217.

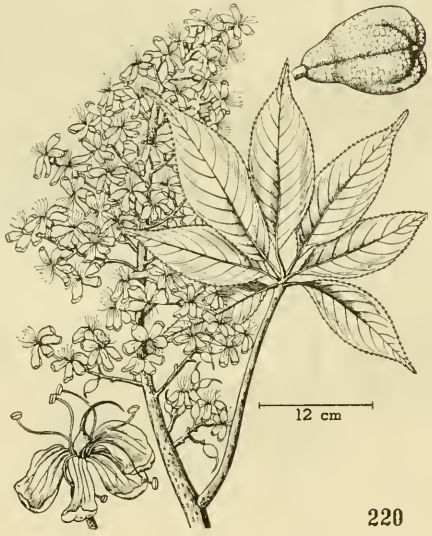
2. Staphylea Linn. Bladder Nut 省沽油属 (Shêng Ku Yu Shu)

Shrubs or small trees with striped bark and *opposite lvs.*: fr. an *inflated* and membranous *capsule*; *seeds without aril*. 11 species, in north temperate regions; 2 in China. (Greek: *staphyle*, grape, since the shape of the inflorescence was thought to resemble a cluster of grapes.)

1. **Staphylea bumalda** DC. 省沽油 (Shêng Ku Yu) (R.M. 565). Shrub, to 5 m.; fls. white, V–VI; fr. IX–X. Japan, China; locally in An., Che., Hup., Ki., Ku. Woodland. Fig. 218.







217. Euscaphis japonica
218. Staphylea bumalda

219. Acer buergerianum
220. Aesculus chinensis

221. Cardiospermum halicacabum
222. Koelreuteria paniculata

98. **ACERACEAE** Maple Family 槭樹科 (Tsu Shu K'o)

Trees or shrubs with watery, often saccharine, sap and *opposite* estipulate *lvs.*: fls. small, *regular*, polygamous or dioecious; petals sometimes wanting; stamens usually 8; ovary 2-celled: fr. flat, splitting at maturity into *two 1-winged samaras.* 2 genera with about 120 species in north temperate regions; both genera and about 60 species in China.

1. **Acer** Linn. Maple 槭樹屬 (Tsu Shu Shu)

Lvs. deciduous, mostly simple, sometimes 3–7-foliolate: *samara winged only on one side.* About 115 species; 58 in China. (The old Latin name.)

Key to the Species

a. Lvs. simple: disk of the fl. intrastaminal.
  b. Fls. in racemes: wings of samara nearly horizontal: (Sect. *Macrantha*).
    Lvs. usually not lobed, ovate or ovate-oblong, 8–14 cm. long; margins unequally serrate: andro-monoecious. 1. *A. davidi*
    Lvs. broadly ovate, subcordate at base, 6–12 cm. long, 5-lobed, the middle lobes longer than the basal two, acuminate; margins doubly serrate: dioecious ..... 2. *A. grosseri*
  bb. Fls. in corymbs or panicles; disk of the fl. extra-staminal.
    c. Lvs. 3–5-lobed, or undivided.
      d. Lvs. mostly 5-lobed, sometimes 3-lobed: fls. andro-monoecious.
        e. Lobes of the lvs. entire: nutlets smooth and flattened (Sect. *Platanoides*).
          Wings of the frs. more than 2× as long as the nutlets: lvs. 8–25 cm. across..... 3. *A. amplum*
          Wings of the frs. less than 2× as long as the nutlets: lvs. 5–13 cm. across..... 4. *A. mono*
        ee. Lobes of the lvs. serrate (Sect. *Spicata*).
          Infl. a few-fld. corymb: lvs. finely and sharply serrate..... 5. *A. oliverianum*
          Infl. a many-fld. panicle: lvs. irregularly and sparingly serrate ..... 6. *A. sinense*
      dd. Lvs. 3-lobed or undivided.
        f. Lvs. definitely 3-lobed.
          Nutlets smooth and flattened; angle of the wings acute: lvs. grayish-pubescent beneath; hairs often stellate: andro-monoecious: fls. in corymbs, on peduncles 1–3 cm. long (Sect. *Platanoides*)... 7. *A. longipes*
          Nutlets convex, veined or ridged.
            Single nutlet 3–5 mm. in diam.; wings of each pair of nutlets acutely angled or nearly parallel; wing and nutlet 15–25 mm. long: lvs. ovate or elliptical, forwardly 3-pointed or sometimes entire, often glaucous and pubescent along the nerves beneath (Sect. *Spicata*) ..... 8. *A. buergerianum*
            Single nutlet 8–10 mm. in diam.; wings

of each pair of nutlets angled at about 90°; wing and nutlet 30–35 mm. long: lvs. 3-lobed, with a few coarse teeth, subcordate at base, pubescent on the nerves beneath: fls. purple: dioecious (Sect. *Lithocarpa*) ..... 9. *A. sinopurpurascens*

ff. Lvs. undivided or irregularly lobed, ovate or elliptic.

Wings of the samara acutely angled: lvs. pubescent along the nerves beneath (Sect. *Spicata*).

Lf. margins irregularly sharply and doubly serrate, 4–10 cm. long, dull green ... 10. *A. ginnala*

Lf. margins entire or irregularly lobed, 2–6 cm. long, glossy above, often glaucous beneath ..... 8. *A. buergerianum*

Wings of the samara obtusely angled or nearly horizontal: lvs. ovate to oblong, subcordate at base, abruptly pointed at tip, 3–7 cm. long; margins remotely serrate near and below apex or nearly entire (Sect. *Integrifolium*) ..... 11. *A. cordatum*

cc. Lvs. 7–9-lobed; segments sharply serrate: wings of the samara obtusely angled (Sect. *almata*).

Petioles and peduncles glabrous or nearly so: ovary and lvs. glabrous ..... 12. *A. palmatum*

Petioles and peduncles pubescent, at least when young: ovary villous: lvs. silky-hairy when young, deeply divided into 9–11 pinnatisect lobes 13. *A. japonicum* f. *aconitifolium*

aa. Lvs. 3–7-foliolate: disks of the fls. wanting (Sect. *Negundo*).

Lvs. trifoliolate; lfts. entire or remotely serrate: androdioecious: fls. in pendulous racemes: brts. pubescent when young ..... 14. *A. henryi*

Lvs. 3–7-foliolate; lfts. coarsely serrate: staminate fls. in corymbose clusters, the pistillate in pendulous racemes: brts. glabrous ..... 15. *A. negundo*

1. **Acer davidi** Franch. 青蝦蟆 (Ch'ing Hsia Ma; Green Toad) (R.M. 580). Tree, to 15 m.; fls. IV–V; fr. IX. Central China; locally in An., Che., Ki., Ku. Forest.
2. **Acer grosseri** Pax 葛蘿槭 (Ko Lo Tsu; Pueraria-net Maple) (R.M. 581). Tree, to 20 m.; fls. IV–V; fr. IX. Central China; locally in An., Che., Hup. Forest.
3. **Acer amplum** Rehd. (R.M. 570). Tree, to 25 m.; fls. IV–V; fr. VIII–IX. Central China; locally in An., Hup., Ki. Forest.
4. **Acer mono** Maxim. 五角楓 (Wu Chio Fêng; Five-angled Maple) (R.M. 569). Tree, to 20 m.; fls. IV–V; fr. IX–X. Japan, north China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.

Since Thunberg used the name *Acer pictum* for the plant now known as *Kalopanax pictus* (Thunb.) Nakai in 1783, it cannot be regarded as valid for this species to which he later applied it (Fl. Jap. (1784) 162).

5. **Acer oliverianum** Pax (R.M. 577). Tree, to 25 m.; fls. IV–V; fr. few, in corymbs,

VIII–IX. China; locally in An., Che., Hun., Hup., Ki. Woodland.

6. **Acer sinense** Pax (R.M. 577). Tree, to 15 m.; fls. IV–V; fr. many, in panicles, VIII–IX. China; locally in An., Che., Hun., Hup. Woodland.
7. **Acer longipes** Franch. ex Rehd. (R.M. 570). Tree, to 25 m.; fls. IV–V; fr. VIII–IX. Central and western China; locally in An., Hup. Woodland.
8. **Acer buergerianum** Miq. Trident Maple 三角楓 (San Chio Fêng) (R.M. 575). Shrub or tree, to 25 m.; fls. IV–V; fr. VIII–IX. Japan, eastern and central China; locally in An., Che., Ki., Ku. Woodland. Fig. 219.
9. **Acer sinopurpurascens** Cheng (Sc.C. 11:230). Tree, to 10 m.; fls. purple, IV–V; fr. VIII–IX. China; locally in Che. Woodland.
10. **Acer ginnala** Maxim. 茶条 (Ch'a T'iao; Tea Shoot) (R.M. 575). Shrub or tree, to 10 m.; fls. IV–V; fr. VIII–IX. Central and north China, Manchuria, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
11. **Acer cordatum** Pax (Sc.C. 11:148). Shrub or tree, to 10 m.; fls. IV–V; fr. VIII–IX. Central and south China; locally in An., Che. Woodland.
12. **Acer palmatum** Thunb. Japan Maple 雞爪槭 (Chi Chua Tsu; Fowl's-claw Maple) (R.M. 577). Shrub or tree, to 15 m.; fls. purple, V; fr. IX. Korea, Japan, eastern China; locally in An., Che., Ki., Ku. Woodland.

A number of varieties and forms of *Acer palmatum* are grown as ornamental shrubs or trees in the Lower Yangtze Valley.

13. **Acer japonicum** Thunb. f. **aconitifolium** (Meehan) Rehd. (R.M. 579). Shrub or small tree; fls. purple, IV; fr. IX. Introduced from Japan; locally in Ku. Planted, ornamental.
14. **Acer henryi** Pax 三葉槭 (San Yeh Tsu; Three-leaved Maple) (R.M. 585). Tree, to 10 m.; fls. IV; fr. IX. Central China; locally in An., Che., Hun., Hup., Ku. Woodland.
15. **Acer negundo** Linn. Box Elder 白蠟槭 (Pai La Tsu; White-wax Maple) (R.M. 585). Tree, to 20 m.; fls. III–IV; fr. VIII–IX. Introduced from eastern North America; locally in Ku. Planted, ornamental.

99. HIPPOCASTANACEAE Horse Chestnut Family 七葉樹科 (Ch'i Yeh Shu K'o)

Trees and shrubs with opposite estipulate *palmately compound lvs.* and irregular andro-polygamous *fls.* in terminal panicles: stamens 5–9, inserted on a disk: fr. dehiscent, usually 1-celled and 1-seeded. 3 genera with about 25 species, mostly in North and South America, a few in eastern Asia; 2 genera and 3 species in China.

1. Aesculus Linn. Horse Chestnut 七葉樹属 (Ch'i Yeh Shu Shu)

Deciduous trees or shrubs: *calyx tubular.* 25 species in North America and Eurasia; 2 in China. (The old Latin name of an oak tree.)

Key to the Species

Lfts. stalked: brts. densely pubescent: fr. surface smooth, not echinate ..... 1. *A. chinensis*
Lfts. sessile: brts. glabrous: fr. echinate ..... 2. *A. hippocastanum*

1. **Aesculus chinensis** Bunge Chinese Horse Chestnut 七葉樹 (Ch'i Yeh Shu; Seven-leaved Tree) (R.M. 588). Tree, to 25 m.; fls. white, V–VI; fr. IX; lvs. palmately

5-7-foliolate. North China; locally in Che., Ku. Cultivated, ornamental. Fig. 220.

2. **Aesculus hippocastanum** Linn. European Horse Chestnut (R.M. 587). Tree, to 20 m.; fls. white, tinged red, V; fr. IX. Introduced from the Balkan region; locally in Ku. Planted, ornamental.

100. SAPINDACEAE Soapberry Family 無患子科 (Wu Huan Tzŭ K'o)

Herbs, shrubs or trees with small sometimes polygamo-dioecious fls.: lvs. various: *disk present*; stamens 5–10; ovary often eccentric: fr. a capsule, berry, drupe or nut, sometimes winged; seeds sometimes arillate. 130 genera with 1100 species, mostly tropical; 14 genera and 16 species in China.

Key to the Genera

Plant herbaceous, a tendril climber: lvs. biternate: fr. an inflated bladdery capsule ..... 1. *Cardiospermum*

Trees with pinnately compound lvs.

Fls. irregular: fr. a dehiscent bladder-like capsule..... 2. *Koelreuteria*

Fls. regular: fr. indehiscent, fleshy or leathery..... 3. *Sapindus*

1. **Cardiospermum** Linn. 風船葛属 (Fêng Ch'uang Ko Shu)

Tendril-bearing *herbaceous* vines with alternate *biternate* exstipulate *lvs.* and small irregular polygamo-dioecious fls.: infl. of axillary peduncled cymes or racemes: sepals and petals 4; stamens 8: *fr. a* 3-celled *membranous inflated* capsule; seeds arillate at the base. 15 species, in warm and temperate regions; 2 in China. (Greek: *cardia*, heart, and *sperma*, seed; from the white heart-shaped spot on the black seed.)

1. **Cardiospermum halicacabum** Linn. Balloon Vine 風船葛 (Fêng Ch'uang Ko; Windboat Pueraria) (B.M. 642). Perennial climbing herb; fls. white, V–VI; fr. an inflated capsule, VIII–IX. Introduced from tropical and subtropical regions; locally in Ku. Planted, ornamental. Fig. 221.

2. **Koelreuteria** Laxm. 欒樹属 (Luan Shu Shu)

Deciduous *trees* with alternate 1–2-*pinnate* exstipulate *lvs.* and yellow *irregular fls.* in large terminal panicles: calyx irregular; disk present; stamens 8: fr. an *inflated membranous capsule* with 3 round black seeds. 5 species, in eastern Asia; 4 in China. (After J. G. Koelreuter, professor of natural history at Karlsruhe, 1733–1806.)

Key to the Species

Lvs. bipinnate; lfts. entire ..... 1. *K. integrifolia*

Lvs. pinnate, or sometimes partly bipinnate; lfts. coarsely and irregularly crenate-serrate, often incised at the base ..... 2. *K. paniculata*

1. **Koelreuteria integrifolia** Merr. 黃山欒樹 (Huang Shan Luan Shu) (Lee 791). Tree, to 20 m.; fls. yellow, VII–VIII; fr. IX–X. China; locally in An., Che., Ku., Hun., Hup. Woodland.
2. **Koelreuteria paniculata** Laxm. 欒樹 (Luan Shu) (R.M. 592). Tree, to 10 m.; fls. yellow, VII–VIII; fr. reddish, IX–X. China, Korea, Japan; locally in Che., Ku. Woodland. Fig. 222.

3. **Sapindus** Linn. Soapberry 無患子属 (Wu Huan Tzŭ Shu)

Trees and shrubs with alternate, mostly pinnate lvs. and small *regular* polygamo-

dioecious *fls.*: infl. in terminal or axillary panicles: stamens 8–10: usually 1 carpel becoming fleshy or leathery, with a globose seed. 15 species, mostly tropical; 2 in China. (From the Latin *Sapo indicus*, Indian Soap.)

1. **Sapindus mukorossi** Gaertn. 無患子 (Wu Huan Tzŭ; No-disease) (R.M. 592). Tree, to 15 m.; fls. pale yellow, regular, V–VI; fr. yellow, IX–X. Japan, Korea, China; locally in An., Che., Hup., Ki., Ku. Woodland. Fig. 223.

101. SABIACEAE Sabia Family 清風藤科 (Ch'ing Fêng T'êng K'o)

Trees or shrubs, often climbing, with alternate, *pinnately veined estipulate lvs.*: infl. paniculate: *sepals imbricate*; *stamens 5, opposite the petals*: fr. usually 1-celled, indehiscent. 4 genera with 90 species, tropical Asia and America; 2 genera and 40 species in China.

Key to the Genera

All 5 stamens fertile; fls. in axillary cymes: lvs. simple: climbing shrubs .. 1. *Sabia*
Only 2 stamens fertile; fls. in terminal panicles: lvs. simple or pinnate: upright trees or shrubs ..... 2. *Meliosma*

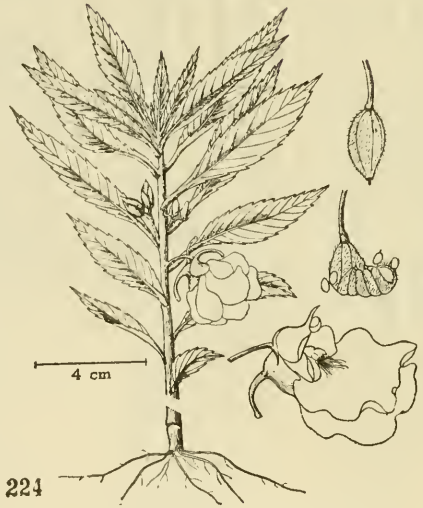
1. Sabia Colebr. 清風藤属 (Ch'ing Fêng T'êng Shu)

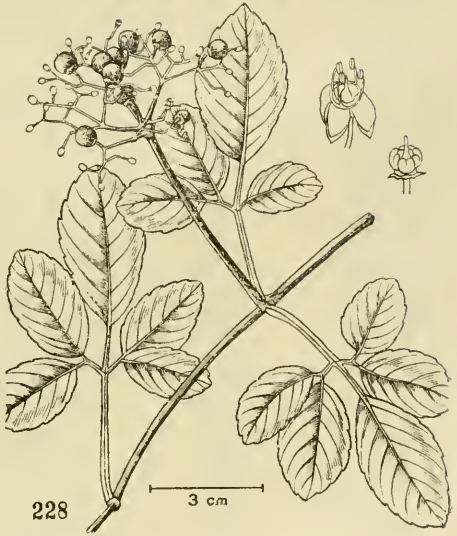
Climbing shrubs with simple entire lvs. and mostly perfect fls.: *infl. axillary*: *all 5 stamens fertile*: fr. with 1–2 reniform seeds. 20 species, in Asia and Malaya; 16 in China. (From the Bengal name, *Sabja-lat.*)

Key to the Species

Brts. glabrous: petioles and lf. blades glabrous or puberulent: lvs. evergreen; blades broadly lanceolate, oblong, elliptic or ovate, 1.5–4 × 2.5–10 cm., coarse-reticulate and dark green above, reticulate and light green or glaucous beneath: calyx lobes 1 mm. long or less, rounded; ovaries glabrous ..... 1. *S. gaultheriifolia*
Brts. and lower surfaces of the lf. blades pubescent.
  Lvs. deciduous, reticulate above, pubescent and reticulate beneath: older brs. bearing short spine-like processes: fls. appearing before the lvs.: lf. blades ovate-lanceolate or ovate, 2–7 cm. long: brts. sparsely pubescent ..... 2. *S. japonica*
  Lvs. evergreen, smooth and pubescent on the midrib above, pubescent and reticulate beneath: lacking spine-like processes: fls. in cymes; petals narrowed upward; lf. blade oblong or elliptic, acuminate, 2.5–6 cm. long: brs. densely pubescent ..... 3. *S. swinhoei*

1. **Sabia gaultheriifolia** Stapf ex L. Chen (Sarg. 3:26). Evergreen scandent shrub; fr. blue at maturity, IX. Central and south China; locally in Che., Hup., Ki. Forest shade.
2. **Sabia japonica** Maxim. (Sarg. 3:34). Scandent deciduous shrub; fls. greenish yellow, V; fr. dark blue at maturity, IX. Japan, southeastern China; locally in An., Che., Hun., Ki., Ku. Forest shade.
3. **Sabia swinhoei** Hemsl. (Sarg. 3:44). Evergreen climbing shrub; fls. yellow, IV; fr. IX; brts. densely pubescent. Formosa, south and central China; locally in Che., Hun., Hup., Ki., Ku. Forest shade.





223. Sapindus mukorossi
224. Impatiens balsamina

225. Hovenia dulcis
226. Paliurus hemsleyanus

227. Zizyphus jujuba
228. Cayratia japonica

2. **Meliosma** Blume 泡花樹属 (P'ao Hua Shu Shu; Glutinous pomentum Tree Genus)

Upright shrubs or trees: *infl. terminal*: fls. irregular, mostly perfect; *only the 2 inner stamens fertile*: fr. a usually 1-seeded drupe. 50 species, in Asia and tropical America; 25 in China. (Greek: *meli*, honey, and *osma*, odor, referring to the fragrant flowers.)

Key to the Species

a. Lvs. simple.
  b. Lvs. evergreen; blades coriaceous, obovate to lanceolate, tapering to the petiole.
    Lf. blades densely brown-curly-hairy beneath, cuneate-lanceolate, acute at apex, tapering to a stout petiole, 5–30 cm. long: brs. of the flg. panicle few, densely curly-hairy; sepals curly-hairy outside, or nearly glabrous, and ciliate, oblong, about 1.3 mm. long: fr. bluish black ..... 1. *M. pannosa*
    Lf. blades barbate, nearly glabrous beneath, 2–8 cm. long; apex rotund or obtuse, abruptly pointed; nerves prominent and pubescent beneath: brs. of the flg. panicle many, spreading-pubescent; sepals glabrous, oval, ciliate, less than 1 mm. long: fr. reddish ..... 2. *M. parviflora*
  bb. Lvs. deciduous, chartaceous or membranous; blades ovate-elliptic or obovate-oblanceolate, acute or acuminate.
    c. Lf. blades entire towards the base, coarsely or remotely serrate or dentate-mucronate towards the apex: fr. red.
      Lf. blades sparsely pubescent beneath, more densely so on the veins, elliptic-ovate, short-acuminate, 6–16 cm. long; margins weakly or obscurely serrate-mucronate, or nearly entire: fertile stamens with slender boat-shaped appendage from base of filament, exserted, often about as long as the style ..... 3. *M. myriantha*
      Lf. blades white-hairy (often densely so) beneath, lanceolateelliptic, 4–15 cm. long; margins coarsely serrat-emucronate towards the apex ..... 4. *M. pilosa*
    cc. Lf. blades usually serrate or dentate along most of the margin on at least some of the lvs.
      Lf. blades barbate beneath, obovate-cuneate, abruptly acuminate, 3.5–15 cm. long: fls. about 4 mm. in diam.; sepals oblong, ciliate; outer 3 petals orbicular, glabrous, entire; the inner 2 smaller, deeply 2-lobed: fr. black 5. *M. cuneifolia*
      Lf. blades pubescent on the nerves beneath, but not barbate.
        Flg. panicles terminating flexible pendulous brs., arcuate, curving upwards: lf. blades membranous, obovate-elliptic, abruptly acuminate, tapering to the petiole, 5–12 cm. long; margins coarsely serrate-dentate, mucronate: fr. black (?) ..... 6. *M. flexuosa*
        Flg. panicles terminating stiff erect brs.: the 3 staminodes alternate with the 3 large outer petals, exserted, about as long as the styles: lf. blades elliptic-ovate, short-acuminate, 6–16 cm. long; margins coarsely (often weakly) serrate-mucronate; or entire towards the base: fr. red ..... 3. *M. myriantha*
aa. Lvs. compound; lfts. ovate, elliptic or lanceolate, obtuse or acumi-

nate; margins entire or remotely crenate-serrate, 2–16 cm. long: fr. black.
Ovary pubescent; petals orbicular,not emarginate, chartaceous; sepals ovate, 1.2–1.5 mm. long: lfts. white-hairy beneath, especially along the nerves ..... 7. *M. oldhami*
Ovary glabrous; outer petals obcordate, emarginate, thin-membranous; sepals oblong, 2–3 mm. long: lfts. brown-hairy along the nerves beneath ..... 8. *M. veitchiorum*

1. **Meliosma pannosa** Hand.-Mazz. (H.-M. 7:644). Evergreen tree, to 15 m.; fls. yellow, VI–VII; fr. black IX–X. Southern and central China; locally in Che., Hun., Hup., Ki. Forest.
2. **Meliosma parviflora** Lecomte (*M. dilatata* Diels) 蒙刺藤 (Mêng Tz'ŭ T'êng; Thorn-covered Vine) (BSBF 54:676; O.B.Z. 88:260). Evergreen tree, to 15 m.; fls. white, VII; fr. reddish, X. Central and western China; locally in Che., Ku. Forest.
3. **Meliosma myriantha** Sieb. & Zucc. (*M. stewardii* Merr.) 廬山泡花樹 (Lu Shan P'ao Hua Shu) (R.M. 594; R.B. 434). Shrub or tree, to 10 m.; fls. white, VI–VII; fr. red, IX–X. Central China; locally in Che., Hun., Ki., Ku. Forest.
4. **Meliosma pilosa** Lecomte 浙江泡花樹 (Chê Chiang P'ao Hua Shu) (BSBF 54:676). Tree, to 20 m.; fls. white or yellowish, VI–VII; fr. red, IX–X. Central and west China; locally in An., Che. Forest.
5. **Meliosma cuneifolia** Franch. (R.M. 594). Shrub or tree, to 6 m.; fls. yellowish white, VI–VII; fr. black, IX–X. Western and central China; locally in An., Che. Forest.
6. **Meliosma flexuosa** Pamp. (*M. pendens* Rehd. & Wils.) 垂枝泡花樹 (Ch'ui Chih P'ao Hua Shu) (R.M. 594; R.B. 434). Shrub or tree, to 8 m., fls. white, VI–VII: fr. black (?), IX–X. Central China; locally in Che., Hun., Hup., Ki. Forest.
7. **Meliosma oldhami** Miq. 南京珂楠樹 (Nanking K'o Nan Shu) (R.M. 595). Tree, to 20 m.; fls. white, VI; fr. black, IX. China, Korea; locally in An., Che., Ki., Ku. Forest.
8. **Meliosma veitchiorum** Hemsl. (R.M. 594). Tree, to 15 m.; fls. yellow, VI; fr. black, VII–VIII; lvs. 4–8 dm. long. Central China; locally in An. Forest.

For a critical treatment of Chinese species of *Meliosma* see "Revision der chinesichen *Meliosma*-Arten" by Georg Cufodontis in Österreichische Bötanische Zeitschrift (Wein) 88: 246-268 (1939). Bibliog.

102. BALSAMINACEAE Balsam Family 鳳仙花科 (Fêng Hsien Hua K'o)

Erect succulent herbs with simple estipulate lvs. and showy *irregular* perfect *fls.*: infl. on 1–2-fld. peduncles: *sepals 3* (rarely 5), usually petaloid, one of them spurred; petals 3 or 5; stamens 5, opposite the petals; disk wanting: fr. a capsule or berry. 2 genera with about 450 species, especially abundant in the mountains of tropical Asia and Africa; one genus and 40 species in China.

1. **Impatiens** Linn. Balsam 鳳仙花属 (Fêng Hsien Hua Shu)

Sepals usually 3; *petals 3*, the lateral ones each formed by the union of a pair of lateral petals: fr. a capsule, elastically dehiscent. About 420 species; 40 in China. (Latin: *impatiens*, impatient, on account of the sudden bursting of the pods when touched.)

Key to the Species

Lvs. lanceolate; margins coarsely serrate: spur of the fl. very slender, less than 1 mm. thick ..... 1. *I. balsamina*
Lvs. ovate to oblong, acuminate; margins crenate; crenis apiculate: spur of the fl. thicker, 1.5 mm. thick ..... 2. *I. furcillata*

1. **Impatiens balsamina** Linn. Garden Balsam 鳳仙花 (Fêng Hsien Hua; Phoenix-fairy Flower) (B.M. 643). Erect annual, to 1 m.; fls. white, red or yellow, VIII; capsule explosive. Tropical and subtropical eastern Asia; locally in An., Ki., Ku. Planted, ornamental. Fig. 224.
2. **Impatiens furcillata** Hemsl. (F.H.E. 1:101). Weak-stemmed annual; fls. yellow or purple, VIII. Korea, China; locally in Che., Hun. Streamsides.

103. RHAMNACEAE Buckthorn Family 鼠李科 (Shu Li K'o)

Trees and shrubs or rarely herbs, often spiny, sometimes climbing, with mostly alternate simple *stipulate lvs.*: fls. small: calyx lobes valvate; petals sometimes wanting; *stamens* 5 or 4, *opposite the petals*; disk present: fr. drupaceous, winged or capsular. About 45 genera with 550 species, temperate and tropical; 10 genera and over 80 species in China.

Key to the Genera

A. Lvs. not 3-nerved: fr. a drupe.
  B. Fr. oblong or cylindrical, with a single stone.
    Twining shrubs: lvs. ovate, entire, with conspicuous parallel veinlets ..... 1. *Berchemia*
    Erect shrubs or trees: lvs. obovate, serrulate, not so conspicuously nerved ..... 2. *Rhamnella*
  BB. Fr. subglobose, with 2–4 nutlets.
    Fls. sessile or nearly so: lvs. mostly opposite ..... 3. *Sageretia*
    Fls. pedicelled: lvs. alternate or opposite ..... 4. *Rhamnus*
AA. Lvs. 3-nerved from the base.
  Brs. of the frtg. infl. fleshy: plant not spiny ..... 5. *Hovenia*
  Brs. of the infl. not fleshy: plants armed.
    Fr. dry, with a leathery exocarp expanding into a flat circular wing ..... 6. *Paliurus*
    Fl. fleshy, a cylindrical drupe with a sharply pointed stone ..... 7. *Zizyphus*

1. Berchemia Neck. Supple Jack 勾兒茶屬 (Kou Êrh Ch'a Shu; Hook-tea Genus)

Deciduous *twining shrubs* with alternate *ovate entire* conspicuously *penninerved lvs.*: infl. of terminal panicles: fls, perfect, 5-merous; ovary superior, 2-celled: *fr.* oblong or cylindric, *a drupe* with a 2-celled stone. 12 species, in Asia, Africa and North America; 10 in China. (Presumably named for Berthout van Berchem, 18th century Dutch botanist.)

Key to the Species

Infl. a broad panicle, 20–25 cm. in diam. at the base, about 20 cm. high, above the lvs.: lvs., 6–9 cm. long; petioles, or some of them, over 20 mm. long.
  Lf. blades glabrous and glaucous beneath, often acute, sometimes pubescent along the nerves ..... 1. *B. floribunda*

Lf. blades pubescent beneath, usually obtuse..... 2. *B. huana*
Infl. a narrow panicle, 3–10 cm. long, often lfy. at the base: lvs. 2–7 cm. long; petioles 7–15 mm. long..... 3. *B. kulingensis*

1. **Berchemia floribunda** (Wall.) Brongn. (H.F. 1:637). Scandent shrub; fls. greenish white, VI–VII; fr. black, IX–X. Eastern Asia; locally in An., Che., Ki., Hun., Hup. Thickets.
2. **Berchemia huana** Rehd. (AA.J. 8:166). Woody vine; fls. yellowish green, VII–VIII; fr. purple, X. East-central China; locally in An., Che. Forest.
3. **Berchemia kulingensis** Schneid. 牛兒藤 (Niu Êrh T'êng; Cow Vine) (Pl.W. 2:216). Woody vine; fls. greenish, VI–VIII; fr. X–XII. East-central China; locally in Ki. Brushland, forest.

2. **Rhamnella** Miq. 長葉緑柴属 (Ch'ang Yeh Lu Ch'ai Shu)

Deciduous *trees or shrubs* with alternate *obovate serrulate lvs.*: infl. of axillary cymes: fls. perfect, 5-merous; stamens perigynous; ovary partly inferior: *fr.* oblong, *drupaceous, with a single stone.* 6 species, in eastern Asia, all occurring in China. (Diminutive of *Rhamnus.*)

1. **Rhamnella obovalis** Schneid.* 長葉緑柴 (Ch'ang Yeh Lu Ch'ai; Long-leaved Reed) (Pl.W. 2:223). Shrub or tree, to 6 m.; fls. IV–V; fr. IX–X, with a single stone. Central China; locally in An., Che., Ki., Ku. Woodland.

* Sterile brs. of *Rhamnella obovalis* are very difficult to distinguish from those of some forms of the variable *Rhamnus crenata*. The following characters will be useful in identifying flg. material of *Rhamnella obovalis:* umbels of the infl. subsessile; bracts and bracteoles whitish, ovate, glabrous; ovary partly buried in the thick disk, 2-celled, 2-ovuled; petals cucullate, entire.

3. **Sageretia** Brongn. 雀梅藤属 (Ch'iao Mei T'êng Shu)

Shrubs, often *climbing*, usually *spiny*, with mostly *opposite penninerved lvs.*: *fls. sessile* or nearly so, perfect, 5-merous; petals hood-like, arched over the stamens; ovary 2–3-celled: *fr. a* subglobose leathery *drupe* with 2–3 nutlets. 15 species, in eastern Asia and North America; 10 in China. (After Auguste Sageret, French botanist, 1763–1851.)

1. **Sageretia theezans** (L.) Brongn. 雀梅藤 (Ch'iao Mei T'êng; Bird-plum Vine) (R.M. 597). Spiny climbing shrub; fls. IX–X; fr. with 2–3 nutlets, IV–V. Central and eastern China; locally in An., Che,, Ku. Thickets.

4. **Rhamnus** Linn. Buckthorn 鼠李属 (Shu Li Shu)

Trees or shrubs, often spiny: lvs. alternate or opposite, *penninerved*: *infl. axillary*: *fls. pedicelled*, perfect, polygamous or unisexual, 4–5-merous; petals sometimes wanting; ovary 2–4-celled: *fr. a* subglobose *drupe* with 2–4 nutlets. About 1,000 species, in north temperate regions; 30 in China. (An old Greek name.)

Key to the Species

a. Lvs. and brs. alternate: stems not spiny..... 1. *R. crenata*
aa. Lvs. and brs. opposite or at least some of them subopposite: spiny, at least occasionally so.

b. Brs. obviously spiny; brts. pubescent: lf. blades 1–5 cm. long.
Calyces and pedicels pubescent or puberulent.
Stipules slender, acicular, 5–6 mm. long: brts., lvs., calyces and pedicels rather densely pubescent, at least when young: lvs. sometimes glabrescent above ..... 2. *R. globosa*
Stipules stout, subulate, 3–4 mm. long: calyces and pedicels pubescent or puberulent: lf. blades puberulent or glabrescent and rugulose above ..... 3. *R. rugulosa*
Calyces, pedicels and brts. glabrous: petioles pubescent .... 4. *R. leptophylla*
bb. Brs. not spiny or with occasional spines: lvs. 6–12 cm. long.
Petioles 5–12 mm. long: lf. blades narrow elliptic to oblong, 6–12 cm. long; margins rather finely but not sharply serrate ..... 5. *R. utilis*
Petioles 2–4 mm. long: lf. blades ovate-lanceolate, 5–11 cm. long; margins rather coarsely and sharply serrate ..... 6. *R. wilsonii*

1. **Rhamnus crenata** Sieb. & Zucc.* 長葉凍緑 (Ch'ang Yeh Tung Lu) (R.M. 604). Shrub, to 3 m.; fls. VI; fr. VIII–IX; infl. pedunculate. Japan and Korea to Central China; locally in An., Che., Hun., Ki., Ku. Woodland.

* Sterile brs. of some forms of *Rhamnus crenata* are very difficult to distinguish from those of *Rhamnella obovalis*. The following characters will be useful in identifying flg. material of *Rhamnus crenata*: flg. umbels often on peduncles 5–12 mm. long; bracts and bracteoles reddish, often lanceolate-subulate, pubescent: ovary entirely free from the disk, 3-celled, 3-ovuled; petals bifid at tip.

2. **Rhamnus globosa** Bunge 山緑柴 (Shan Lu Ch'ai; Mountain Reed) (R.M. 600). Spiny shrub; fls. IV–V; fr. black, IX–X. Northern and central China; locally in An., Che., Hun., Ki., Ku, Brushland.
3. **Rhamnus rugulosa** Hemsl.* (R.M. 601). Shrub, to 2.5 m.; fls. V; fr. black, IX–X. Central and western China; locally in Che., Ku. Brushland.

* It is probable that the material here separated from *Rhamnus globosa* will merit distinction also from *Rhamnus rugulosa* as it occurs in Hupeh and adjacent provinces. The vegetative characters, e.g. spines and pubescence, so widely used in keying the species of *Rhamnus* are not satisfactory, but much time and abundant material will be required if the classification of the Chinese species is to be revised.

4. **Rhamnus leptophylla** Schneid. 鼠李 (Shu Li; Rat Plum) (R.M. 599). Shrub, to 3 m.; fls. IV–V; fr. IX–X. Japan, eastern China; locally in Ku. Brushland.
5. **Rhamnus utilis** Decne. 凍緑樹 (Tung Lu Shu; Icy-green Tree) (R.M. 599). Shrub, to 3 m.; fls. IV–V; fr. black, IX–X. Central and eastern China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
6. **Rhamnus wilsonii** Schneid. (Pl.W. 2:240). Shrub, to 2 m.; fls. V; fr. VIII–IX. Central China; locally in Hup., Ki. Forest.

6a. **Rhamnus wilsonii** Schneid. var. **pilosa** Rehd. (AA.J. 8:167). Lvs. pilose beneath. Central China; locally in An., Ki.

5. **Hovenia** Thunb. 枳椇属 (Chih Chü Shu)

A *deciduous unarmed tree*: *lvs.* alternate, estipulate, *3-nerved from the base*: infl. of axillary and terminal cymes: fls. perfect, 5-merous; petals rolled up, enclosing the stamens: fr. 3-celled and 3-seeded, indehiscent: *brs. of the infl. becoming fleshy*

at maturity. One species, in China, cultivated in Japan and India. (After David Hoven, Dutch commissioner in Japan who assisted Thunberg with his researches.)

Key to the Species

Peduncles and frs. glabrous	1. *H. dulcis*
Peduncles, frs. and axes of the infl. fulvous-hairy	2. *H. trichocarpa*

1. **Hovenia dulcis** Thunb. Japanese Raisin Tree 枳椇 (Kuai Tsao; Zigzag Jujube) (R.M. 605). Tree, to 10 m.; fls. VI–VIII; fr. IX–X. China; locally in An., Che., Ki., Ku. Woodland. Fig. 225.
2. **Hovenia trichocarpa** Chun & Tsiang 毛枳椇 (Mao Chih Chü) (Suny. 4:16). Tree, to 10 m.; fls. VI–VII; fr. VIII–IX. China; locally in An., Che., Hun. Woodland.

6. **Paliurus** Mill. 銅錢樹屬 (T'ung Ch'ien Shu Shu)

Usually deciduous trees or shrubs, mostly *with stipular spines*: *lvs.*, alternate, *3-nerved from the base*: infl. of axillary or terminal cymes: fls. perfect, 5-merous; ovary inferior: *fr.* dry, 2–3-celled, *surrounded by a flat circular wing*. 6 species, in Eurasia; 4–5 in China. (An old Greek name.)

Key to the Species

Plant glabrous: fr. 2–3.5 cm. across	1. *P. hemsleyanus*
Brts., lvs. and infl. more or less pubescent or tomentose.	
Brts., lvs. and infl. sparsely pubescent: fr. glabrous, about 1 cm. across	2. *P. hirsutus*
Brts., infl. and fr. densely tomentose: fr. 1–1.5 cm. across	3. *P. ramosissimus*

1. **Paliurus hemsleyanus** Rehd. (*P. orientalis* Hemsl., non Franch.) 銅錢樹 (T'ung Ch'ien Shu; Cash Tree) (R.M. 596). Tree, to 20 m.; fls. V; fr. IX. Central China; locally in An., Ku. Woodland. Fig. 226.
2. **Paliurus hirsutus** Hemsl. 長梗銅錢樹 (Ch'ang Kên T'ung Ch'ien Shu; Long-branched Cash Tree) (Lee 795). Tree, to 20 m.; fls. V; fr. glabrous, IX. Eastern China; locally in An., Ki. Woodland.
3. **Paliurus ramosissimus** Poir. 鉄籬笆 (T'ieh Li Pa; Iron Fence) (Lee 796). Shrub, to 3 m.; fls. VII; fr. brown-tomentose, IX. China; locally in Hun., Ki. Brushland.

7. **Zizyphus** Mill. 棗屬 (Tsao Shu)

Shrubs or trees, usually *with stipular spines*: *lvs.* alternate, *3–5-nerved from the base*: infl. in axillary cymes: fls. perfect, 5-merous; ovary usually 2-celled: *fr. a drupe with a sharply pointed stone*. 40 species, tropical and subtropical; 3 in China. (From Zizyphon, an old Greek name for *Z. jujuba*.)

1. **Zizyphus jujuba** Mill. Chinese Date 棗 (Tsao) (R.M. 596). Shrub or tree, to 10 m.; fls. IV–V; fr. IX–X; with stipular spines. Eurasia; locally in An., Hup., Ki., Ku. Thickets and Woodland. Fig. 227.

1a. **Zizyphus jujuba** var. **inermis** (Bge.) Rehd. (R.M. 596). Tree, to 10 m.; brs. unarmed. Grown for its fruit.

There are a large number of horticultural varieties in cultivation varying widely in the size, shape and quality of the fruit. It is known that root suckers and sprouts on many apparently unarmed trees will develop spines, so var. *inermis* may be only an adult form of the plant.

104. **VITACEAE** Grape Family 葡萄科 (P'u T'ao K'o)

Woody vines (rarely herbaceous), *climbing by tendrils*, with *alternate palmately veined or compound* stipulate *lvs.*: infl. in cymes, corymbs or panicles, usually opposite a lf.: fls. small; petals valvate, sometimes joined at the base; *stamens opposite the petals*; disk present: *fr. a berry*. 11 genera with about 600 species, tropical and subtropical; 8 genera and 90 species in China.

Key to the Genera

A. Vines herbaceous, or apparently so: lvs. compound: infl. cymose.. 1. *Cayratia*
AA. Vines woody.
Tendrils with expanded adhesive tips: lvs. dimorphic: fls. without a conspicuous glandular disc ..... 2. *Parthenocissus*
Tendrils not expanded at the tips: lvs. not dimorphic: fls. with a glandular disc.
Infl. in cymes: petals separating and spreading at the opening of the fl. ..... 3. *Ampelopsis*
Infl. in panicles: petals joined in a cap which falls at the opening of the fl. ..... 4. *Vitis*

1. **Cayratia** Juss. 烏蘞莓屬 (Wu Lien Mei Shu)

Climbing shrubs or *herbs*, usually with branched tendrils: *lvs. 3-foliolate* or 5–9-foliolate and pedate, with stalked lfts.: *infl. in* axillary paniculate *cymes*: fls. perfect, 4-merous: fr. 2–4-seeded. 16 species, in eastern Asia; 6 in China. (The latinized Indian name.) Syn. *Columella* Lour.

Key to the Species

Lfts. remotely serrate; terminal lft. lanceolate, 10–12 cm. long: anthers elliptic-oblong ..... 1. *C. japonica*
Lfts. more closely serrate: terminal lft. ovate, 6–8 cm. long: anthers orbicular ..... 2. *C. tenuifolia*

1. **Cayratia japonica** (Thunb.) Gagnep. (*Vitis japonica* Thunb., *Cissus japonica* (Thunb.) Willd., *Columella japonica* (Thunb.) Merr.) Bush Creeper 烏蘞莓 (Wu Lien Mei; Black-vine Berry) (R.M. 621). Succulent vine; fls. VI–VIII; fr. black, VII–IX. Eastern Asia; locally in An., Hun., Ki., Ku. Thickets. Fig. 228.
2. **Cayratia tenuifolia** (W. & A.) Gagnep. (*Vitis tenuifolia* Wight & Arn.) (H.F. 1:660). Vine, woody at base; fls. VI–VIII; fr. black, VIII–X. Central and southern China; locally in An., Hup., Ki. Thickets.

2. **Parthenocissus** Planch. 地錦屬 (Ti Chin Shu)

Climbing shrubs: *tendrils* usually with *disc-like* adhesive *tips*: lvs. dimorphic, those on the young shoots smaller and of different form than those on mature shoots, digitate or at least some of them 3-lobed: infl. in cymes, opposite the lvs.: petals spreading: fr. dark blue or black, 1–4-seeded. 10 species, in eastern Asia and North America; 7 in China. (Greek: *parthenos*, virgin, and *kissos*, ivy, –a translation of the French name.)

Key to the Species

a, Lvs. on flg. brts, simple, often 3-lobed or -cleft ..... 1. *P. tricuspidata*

aa. Lvs. on flg. brts. 3–5-foliolate.
Lateral lfts. very oblique at the base; lfts. 6–12 cm. long ..... 2. *P. heterophylla*
Lateral lfts. not oblique at the base.
Plant stout: fls. many: lfts. 5–10 cm. long, more or less pubescent beneath ..... 3. *P. laetevirens*
Plant slender: fls. few: lfts. 3–5 cm. long, glaucous beneath .. 4. *P. thomsonii*

1. **Parthenocissus tricuspidata** (S. & Z.) Planch. Boston Ivy 爬牆虎 (P'a Ch'iang Hu) (R.M. 620). Woody vine; fls. VI–VII; fr. bluish black, IX–X. Japan, central China; locally in An., Che., Hun., Hup., Ki., Ku. Cliffs and tree trunks, or cultivated, ornamental. Fig. 229.
2. **Parthenocissus heterophylla** (Bl.) Merr. (*P. landuk* Gagnep.) 地錦 (Ti Chin; Floor Ornament) (Pl.W. 1:102; Ph.J. 11:129). Woody vine; fls. VI; fr. VIII–IX. China; Philippines; locally in An., Che., Ki. Cliffs.
3. **Parthenocissus laetevirens** Rehd. (R.M. 619). Woody vine; fls. VII–VIII. fr. IX. Central China; locally in An., Che., Hun., Hup., Ki., Ku. Planted, ornamental.
4. **Parthenocissus thomsonii** (Lawson) Planch. (R.M. 620). Woody vine; fls. VII; fr. black, VIII. Himalayas, central China; locally in An., Che., Hun., Hup., Ki. Cliffs.

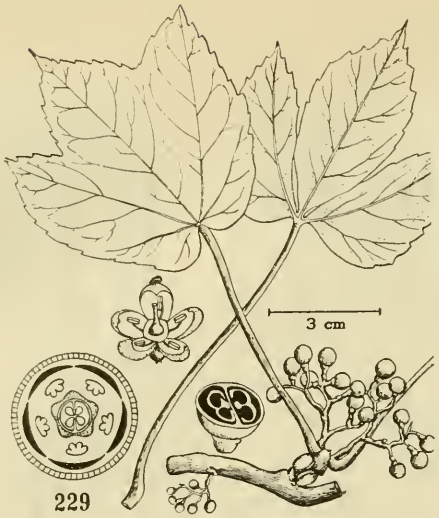
3. **Ampelopsis** Michx. 山葡萄屬 (Shan P'u T'ao Shu)

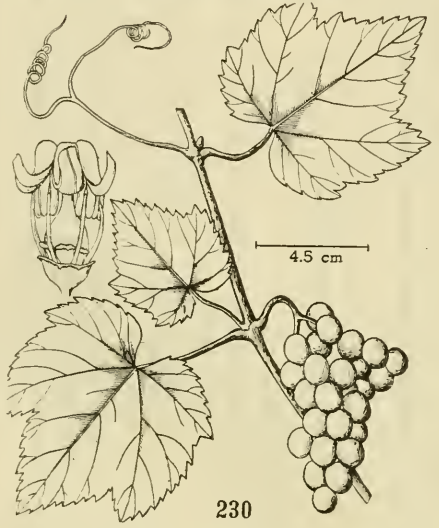
Deciduous climbing shrubs with lenticellate bark and white pith: *infl. in cymes* opposite the lvs.: fls. perfect, mostly 5-merous; *petals expanding* and *falling separately*: fr. 1–4-seeded. 20 species, in Asia and North America; 13 in China. (Greek: *ampelos*, grape, and *opsis*, likeness.)

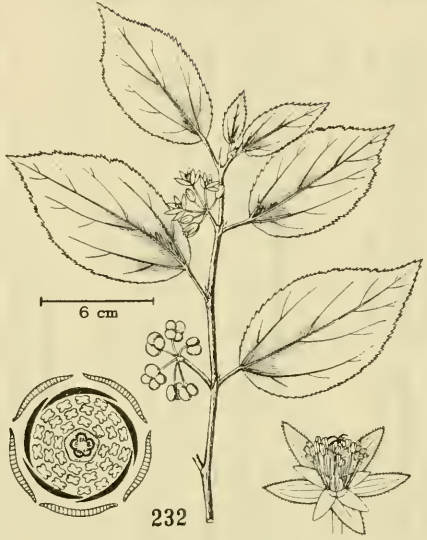
Key to the Species

a. Lvs. simple,often lobed.
Lvs. glaucescent beneath..... 1. *A. bodinieri*
Lvs. green and more or less pubescent beneath ..... 2. *A. brevipedunculata*
Shallow lobes of the lvs. caudate-acuminate; margins remotely sinuate-dentate or denticulate: brs. glabrous 2a. *A. brevipedunculata* var. *kulingensis*
Lvs. deeply 3–5-lobed, with rounded sinuses, glabrous or glabrescent: peduncles long ..... 2b. *A. brevipedunculata* var. *maximowiczii*

aa. Lvs. compound.
b. Lvs. trifoliolate or digitately 5-cleft or -foliolate.
Lvs. trifoliolate.
Lfts. all sessile, mostly cuneate at the base: fr. orange or buff colored..... 3a. *A. aconitifolia* var. *glabra*
Central lft. short-stalked; lateral lfts. very oblique: fr. dark blue ..... 4. *A. delavayana*
Lvs. digitately 5-cleft or -foliolate: fr. orange or buff colored ..... 3. *A. aconitifolia*
bb. Lvs., or most of them, pinnately compound; some of the lfts. compound.
Rachis of the lf. broadly winged; lfts. sessile, mostly cleft or compound; pinnae sessile and articulate,







229. Parthenocissus tricuspidata
230. Vitis labrusca

231. Tilia miqueliana
232. Grewia biloba

233. Corchorus capsularis
234. Malva sylvestris

ovate to oblong-ovate, irregularly and coarsely toothed: fr. blue ..... 5. *A. japonica*

Rachis of lf. not winged; lower pr. or 2 prs. of lfts. ternate; lfts. ovate to oblong; margins coarsely serrate or nearly entire; terminal lfts. 5–7 cm. long, on stalks about 2 cm. long; lateral lfts. smaller and on shorter stalks: fr. violet ..... 6. *A. cantoniensis*

1. **Ampelopsis bodinieri** (Lévl. & Vant.) Rehd. 爬山虎 (P'a Shan Hu; Mountain-climbing Lizard) (R.M. 616). Climbing vine; fls. V–VII; fr. dark blue, IX–X. Central China; locally in Che., Hup., Ki., Ku. Thickets.
2. **Ampelopsis brevipedunculata** (Maxim.) Trautv. (*A. heterophylla* S. & Z.) 山葡萄 (Shan P'u T'ao; Mountain Grape) (R.M. 617). Climbing vine; fls. VI–VIII; fr. lilac, IX–X. Northeastern Asia; locally in Che., Hup., Ki., Ku. Thickets.

2a. **Ampelopsis brevipedunculata** var. **kulingensis** Rehd. China; locally in Ki. (B. G. 1:36).

2b. **Ampelopsis brevipedunculata** var. **maximowiczii** (Regel) Rehd. China; locally in Che. (R.M. 617).

3. **Ampelopsis aconitifolia** Bunge 草葡萄 (Ts'ao P'u T'ao; Herbaceous Grape) (R.M. 617). Trailing vine; fls. V–VIII; fr, orange, VIII–IX; lvs. 5-cleft or ternate. Northern and central China; locally in Ku. Grassland, thickets.

3a. **Ampelopsis aconitifolia** var. **glabra** Diels & Gilg China; locally in Ku. (R.M. 617).

4. **Ampelopsis delavayana** Planch. (R.M. 617). Trailing vine; fls. VII–VIII; fr. dark blue, X. Central and western China; locally in An., Hun., Hup., Ki. Thickets, forest.
5. **Ampelopsis japonica** (Thunb.) Mak. (*A. serjaniaefolia* Bge.) 白蔹 (Pai Lien; White Vine) (R.M. 618). Trailing vine; fls. V–VIII; fr. blue, IX–X. Japan, north China; locally in An., Che., Hun., Ku. Grassland, thickets.
6. **Ampelopsis cantoniensis** (H. & A.) Planch. (*Vitis cantoniensis* Hk. & Arn.) (H.F. 1:663). Woody climber; fls. VI–VII; fr. violet, IX–X. South China; locally in An., Che., Ki. Forest.

4. **Vitis** Linn. Grape 葡萄属 (P'u T'ao Shu)

Woody vines with shredding bark and brown pith: *infl. in panicles*, opposite the lvs.: fls. polygamo-dioecious, 5-merous; *petals cohering* at the top and *falling together*: fr. 2–4-seeded. 60 species, mostly in north temperate regions; 40 in China. (Old Latin name of the grape.)

Key to the Species

a. Lvs. simple, entire, serrate, dentate or lobed.
  b. Brs. profusely blunt-spiny ..... 1. *V. davidii*
  bb. Brs. glabrous or pubescent, not spiny.
    c. Lf. margins entire, serrate or dentate, not deeply lobed.
      d. Lf. blades glabrous, pubescent, flocculose- or araneous-hairy, not densely and persistently tomentose.
        e. Lvs. ovate-lanceolate, oblong or long-lanceolate. Lvs. glabrous, glaucous beneath, ovate-lanceolate to long-lanceolate; margins remotely

shallowly dentate; petioles 1.5–3 cm long. 2. *V. chungii*
Lvs. rufous-hairy on the nerves beneath; lower surface gray-pubescent; margins remotely serrate; blades sessile or short-petiolate ..... 3. *V. hancockii*
ee. Lvs. broadly ovate, triangular-ovate or sub-orbicular.
f. Plants more or less pubescent.
Slender trailing vine with membranous ovate-acuminate remotely dentate lvs. 3–8 cm. broad which become almost glabrous at maturity ..... 4. *V. flexuosa*
More robust woody vines with sub-coriaceous broad-ovate cordate or subcordate rounded, acute or briefly acuminate dentate or denticulate lvs. 5–12 cm. broad; lower surface more or less pubescent at maturity.
Fr. blue-black: hairs along the nerves of the lvs. beneath gray or whitish. 5. *V. betulifolia*
Fr. black, with waxy bloom: hairs along the nerves of the lvs. beneath tawny or brownish..... 6. *V. wilsonae*
ff. Plant glabrous: lvs. sub-orbicular to broad-ovate, 5–12 cm. broad; margin notched with triangular teeth: fr. dull purple, not bloomy ..... 7. *V. rotundifolia*
dd. Lf. blades densely and persistently tomentose beneath.
Lvs. small, ovate-cordate, acute at apex, 2.5–4 cm. long, densely short-pubescent above: brts. densely light-brown-pubescent ..... 8. *V. hui*
Lvs. large, broad-ovate or orbicular-ovate, often shallowly 3-lobed, 6–15 cm. wide, glabrous above: brs. flocculose-pubescent.
Tendrils continuous, i.e. a tendril or an infl. at every node: lvs. rarely deeply lobed, with rounded sinuses: introduced and planted for its fr..... 9. *V. labrusca*
Tendrils intermittent, i.e. a tendril or an infl. at every 3rd node: lvs. often shallowly 3-lobed: native vine of thickets and woodland. 10. *V. quinquangularis*
cc. Lvs. deeply 3-lobed, with rounded sinuses.
Tendrils, continuous, i.e. a tendril or an infl. at each node: vines introduced and cultivated for their fr. 9. *V. labrusca*
Tendrils intermittent, i.e. some nodes without tendril or infl.: vines native in thickets: lf. blades glabrous above, usually densely tomentose beneath ..... 11. *V. thunbergii*
aa. Lvs., or some of them ternately compound, rufouspubescent beneath; lateral lfts. very oblique, sessile or nearly so; terminal lfts., or some of them, conspicuously stalked..... 12. *V. piazeskii*

1. **Vitis davidii** (Carr.) Foëx 刺葡萄 (Tz'ŭ P'u T'ao; Thorny Grape) (R.M. 615.)

Vigorous vine; fls. VI–VII; fr. black, IX–XI China; locally in An., Che., Hun., Hup., Ki., Ku. Forest, thickets,

2. **Vitis chungii** Metcalf (L.S.J. 11:102). Woody vine; fls. VI; fr. VIII. South China; locally in Ki. Thickets.
3. **Vitis hancockii** Hance (*V. fagifolia* Hu) 山毛榉葉葡萄 (Shan Mao Chü Yeh P'u T'ao; Mountain Hairy Pterocarya-leaf Grape) (I.P.S. 2:37; L.S.J. 11:102). Trailing; fls. IV–V; fr. black, VII–VIII. East-central China; locally in An., Che. Brushland.
4. **Vitis flexuosa** Thunb. 葛藟 (Ko Lei; Blossoming Vine) (R.M. 612). Slender vine; fls. VI; fr. black, IX; lvs. pubescent on the veins beneath. Japan, Korea, China; locally in Ku. Thickets, grassland.
5. **Vitis betulifolia** Diels & Gilg (L.S.J. 11:102). Woody vine; fls. VI; fr. blue-black, without waxy bloom, IX. Central and western China; locally in Ku. Thickets.
6. **Vitis wilsonae** Veitch (R.M. 616). Woody vine; fls. VI; fr. black, with waxy bloom, IX. Central China; locally in An., Hup., Ki., Ku. Woodland.
7. **Vitis rotundifolia** Michx. (R.M. 615). Vigorous vine; fls. VI; fr. purple, VIII–IX. Introduced from eastern North America; locally in Ku. Cultivated, fruit.
8. **Vitis hui** Cheng (Sc.C. 10:77). Scandent shrub; fr. VIII. Central China; locally in Ki. Thickets.
9. **Vitis labrusca** Linn. Fox Grape (R.M. 615). Vigorous vine; fls. VI; fr. purple-black, IX. Introduced from eastern North America; locally in An., Ku. Cultivated, fruit. Fig. 230.
10. **Vitis quinquangularis** Rehd. (*V. pentagona* Diels & Gilg) 毛葡萄 (Mao P'u T'ao; Hairy Grape) (R.M. 614; AA.J. 26:480). Vigorous vine; fls. VI; fr. IX. Central and western China; locally in An., Che., Hup., Ki. Thickets.
11. **Vitis thunbergii** Sieb. & Zucc. 蘡薁 (Ying Yu; Green Vine) (R.M. 614). Slender vine; fls. VII–VIII; fr. black, IX–X; teeth of lvs. apiculate. Japan, China; locally in An., Hup., Ki., Ku. Thickets.
12. **Vitis piasezkii** Maxim. (R.M. 615). Woody vine; fls. V; fr. VIII. China; locally in Che., Hun., Hup. Woodland.

105. ELAEOCARPACEAE Elaeocarpus Family 膽八樹科 (Tan Pa Shu K'o)

Trees and shrubs with simple penninerved lvs.: infl. of racemes, panicles or fascicles: fls. regular, usually perfect; *stamens numerous, free to the base*; anthers opening by terminal pores; disk present; *ovary 2–many-celled*: *fr. a capsule or drupe.* 7 genera with 125 species, in tropical regions; 2 genera and 15 species in China.

Key to the Genera

Fr. a spiny 4-valved capsule: sepals and petals 4 ..... 1. *Sloanea*
Fr. a 1-stoned drupe: sepals and petals 5 ..... 2. *Elaeocarpus*

1. **Sloanea** Linn. 猴歡喜属 (Hou Huan Shi Shu; Monkey's-joy Genus)

Trees with simple penninerved lvs. and infl. of panicles, racemes or fascicles: fls. bisexual; *sepals*, *petals* and carpels *4*; stamens numerous, on a fleshy disc: *fr. a spiny 4-valved capsule*; seeds 1 in each cell. 60 species, mostly of South America, but a few in Malaya, Indo-China and South China; 4 or 5 species in South China. (Named in honor of Sir Hans Sloane, British physician and botanist, 1660–1753.)

1. **Sloanea sinensis** (Hance) Hu (AA.J. 5:230). Tree, to 15 m.; fls. VIII–IX; fr. X–XI; valves of mature carpels purple within. South China; locally in Che., Ki. Forest.

2. **Elaeocarpus** Linn. 胆八樹属 (Tan Pa Shu Shu)

Trees with simple penninerved lvs. and infl. of axillary racemes: fls. bisexual; *sepals and petals 5*; stamens numerous, in groups, attached within the receptacle and alternating with its lobes; ovary 2–5-celled: *fr. a drupe* with one bony stone; seeds 1 in each cell. 50 species, in the Old World tropics from Australia to South China; 10 or more species in South China. (Greek: *elaeo*, olive, and *carpon*, fruit, from the resemblance of the fruit of certain species to that of the olive.)

Key to the Species

Petals crenulate or shortly toothed at the top, not laciniate: lvs. punctate beneath; secondary nerves usually extending to the serration sinuses. 1. *E. chinensis*

Petals laciniate into filiform divisions, cleft to the middle: lvs. not punctate; secondary nerves arcuate, not extending to the margin ..... 2. *E. sylvestris*

1. **Elaeocarpus chinensis** (Gard. & Champ.) Hook. f. (Be.F. 43). Tree, to 10 m.; fls. V; fr. blue-black, X. South China; locally in An., Che., Ki. Forest.
2. **Elaeocarpus sylvestris** (Lour.) Poir. (*E. decipiens* Hemsl.) 胆八樹 (Tan Pa Shu) (Mak.F. 340; Suny. 2:278). Tree, to 20 m.; fls. VI–VII; petals laciniate; fr. blue-black, X. Indo-China, south China, Japan; locally in Che., Hun., Ki. Forest.

106. **TILIACEAE** Linden Family 椴樹科 (Tuan Shu K'o)

Trees, shrubs or herbs with mostly *alternate* simple stipulate undotted *lvs.* and perfect regular fls.: sepals and petals 3–5, free, valvate (petals rarely wanting); *stamens 10 or more*, the *filaments* usually *united* at the base *into 5 bundles*: fr. a capsule, nut, drupe or berry. 41 genera with 400 species, widely distributed; 5 genera and 25 species in China.

Key to the Genera

A. Plants woody: fr. indehiscent at maturity.
  Peduncles adnate, for about half their length, to a large oblong yellow or whitish membranous bract: lvs. long-petiolate ..... 1. *Tilia*
  Peduncles without bracts: lvs. short-petiolate ..... 2. *Grewia*

AA. Plants herbaceous: fr. a dehiscent capsule.
  Stamens all fertile ..... 3. *Corchorus*
  Half the stamens without anthers ..... 4. *Corchoropsis*

1. **Tilia** Linn. Linden 椴樹属 (Tuan Shu Shu)

Deciduous trees, mostly pubescent with fascicled hairs, and with long-petiolate lvs.; stipules caducous: infl. in drooping cymes, the *peduncle adnate*, for about half its length, *to a membranous* ligulate *bract*: fls. yellow or white; sepals and petals 5; the fascicles of stamens opposite the petals; ovary 5-celled: *fr.* globose or ovoid, *indehiscent*, with usually 1–3 seeds. 30 species, in north temperate regions; 15 in China. (An old Latin name.)

Key to the Species

a. Lvs. denticulate, with slender bristle-like teeth, broadly ovate,

shortly acuminate, 5–13 cm. long, bearded in axils of nerves beneath ..... 1. *T. henryana* var. *subglabra*

aa. Lvs. entire, or serrate with short-aristate or mucronate teeth.
b. Lvs. densely gray-stellate-tomentose beneath.
Lvs. orbicular-ovate-cordate, acuminate, not much longer than broad, 6–10 cm. wide; margins coarsely mucronate-serrate; teeth spreading irregularly ..... 2. *T. mandshurica*
Lvs. deltoid- or ovate-acuminate; base oblique-cordate or -subcordate; margins coarsely serrate; teeth stiff and uniformly angled ..... 3. *T. miqueliana*
bb. Lvs. glabrous or pubescent beneath, not tomentose.
c. Margins of the lvs. entire, sinuate or irregularly toothed.
Lvs. ovate or broadly ovate, acuminate, oblique at base, 7–13 cm. long, glaucous (gray-glandular-pappilose) and stellate-pubescent or glabrous beneath.
Margins of the lvs. entire, undulate or denticulate: flg. bract narrowly oblong, about equal to the peduncle, unequal at the base, not stipitate..... 4. *T. leptocarya*
Margins of the lvs. shallowly 3-lobed; flg. bract broader, rotund at the base, on a stipe 3 cm. long ..... 4a. *T. leptocarya* var. *triloba*
Lvs. oblong, acuminate, 7–11 cm. long, oblique at base, glabrous ..... 5. *T. oblongifolia*
cc. Margins of lvs. sharply and regularly serrate.
Lvs. finely stellate-pubescent or nearly glabrous beneath: staminodes stalked-spatulate, much exceeding the stamens ..... 6. *T. chingiana*
Lvs. coarse-hairy along the nerves and in the nerve-sinuses or nearly glabrous beneath, lacking fine stellate hairs..... 7. *T. japonica*

1. **Tilia henryana** Szysz. var. **subglabra** V. Engl. 糯米樹 (No Mi Shu; Glutinous-rice Tree) (R.M. 626). Tree, to 15 m.; fls. VI–VIII; fr. IX–X. Central China; locally in An., Hup., Ki., Ku. Forest.
2. **Tilia mandshurica** Rupr. & Maxim. 糠椴 (K'ang Tuan; Husk Tilia) (R.M. 627). Tree, to 20 m.; fls. VI–VII. Northeastern Asia; locally in Ku. Woodland.
3. **Tilia miqueliana** Maxim. 菩提樹 (P'u T'i Shu; Tree-of-intelligence) (R.M. 627). Tree, to 15 m.; fls. VI; fr. IX. Eastern China; locally in Che., Ku. Woodland. Fig. 231.
4. **Tilia leptocarya** Rehd. (I.P.S. 4:45). Tree, 30 m. high; fls. VII–VIII; fr. IX–X East-central China; locally in An., Che., Ki. Woodland.
4a. **Tilia leptocarya** var. **triloba** Rehd. (AA.J. 8:172). China; locally in An., Ki.
5. **Tilia oblongifolia** Rehd. (I.P.S. 4:40). Tree, to 20 m.; fls. VI–VII; fr. VIII–IX. East-central China; locally in An. Forest.
6. **Tilia chingiana** Hu & Cheng (Sc.C. 10:79). Tree, to 15 m.; fls. VI–VII; fr. VIII–IX. Central China; locally in An., Ki. Woodland.
7. **Tilia japonica** (Miq.) Simonkai (R.M. 624). Shrub or tree, to 20 m.; fls. VII; fr. VIII–IX. East-central China, Japan; locally in An., Che., Ku. Woodland.

2. **Grewia** Linn. 扁担桿子属 (Pien Tan Kan Tzŭ Shu)

Trees or shrubs, mostly stellate-pubescent: lvs. short-petiolate: infl. in terminal

and lateral cymes: *peduncles ebracteate*; sepals and petals 5 (petals rarely wanting); ovary 5-celled: fr. a drupe with one or several stones. 90 species, tropical and subtropical. Asia, Africa and Australia; 10 in China. (After Nehemiah Grew, 1628–1682. English physician and botanist.)

1. **Grewia biloba** G. Don (*G. glabrescens* Benth.) 扁担桿子 (Pien Tan Kan Tzŭ; Carrying-Pole) (R.M. 628; R.B. 457). Shrub, to 3 m.; fls. VII–VIII; fr. X; lvs. sparsely stellate-pubescent beneath. North China, Korea; locally in An., Che., Hun., Hup., Ki. Thickets, woodland. Fig. 232.

1a. **Grewia biloba** var. **parviflora** (Bunge) Hand.-Mazz. (R.M. 628). Lvs. densely stellate-tomentose beneath. China; locally in An., Che., Ki., Ku.

3. **Corchorus** Linn. 黃麻屬 (Huang Ma shu)

Herbs, often suffrutescent: lvs. usually with tail-like appendages at the base of the blade: infl. axillary: fls. yellow; sepals and petals 4–5; *stamens all fertile*; ovary 2–6-celled: *capsule dehiscent*, 2–5-valved. About 35 species, widely distributed; 3 in China. (An old Greek name of some bitter plant.)

Key to the Species

Capsule globose-pyriform, not beaked ..... 1. *C. capsularis*
Capsule cylindrical, beaked ..... 2. *C. acutangulus*

1. **Corchorus capsularis** Linn. Jute 黃麻 (Huang Ma; Yellow Hemp) (B.M. 654). Annual, to 5 m.; fls. yellow, VII–VIII; fr. globose, IX. Introduced from India; locally in Ki., Ku. Cultivated, fiber. Fig. 233.
2. **Corchorus acutangulus** Linn. 根黃麻 (Tuan Huang Ma; Linden Corchorus) (M.F. 315). Annual, to 2 m.; fls. yellow, VIII; fr. cylindric, X. Tropical regions; locally in Ki., Ku. Moist places.

4. **Corchoropsis** Sieb. & Zucc. 田麻屬 (T'ien Ma Shu)

Erect slender *herb*: lvs. without tail-like appendages at the base: infl. axillary: fls. yellow; sepals and petals 5; *alternate stamens sterile*: *capsule* 3-valved, the *valves* and seeds *separating at maturity*, leaving the *spirally twisted seed column* attached to the receptacle and resembling a cork screw in appearance. One species, in eastern Asia. (The name means "appearing like *Corchorus*".)

1. **Corchoropsis tomentosa** (Thunb.) Mak. (*C. crenata* Sieb. & Zucc.) 田麻 (T'ien Ma; Field Hemp) (Mak.F. 338; Bo.Ma.T. 17:11). Annual, to 1 m.; fls. yellow, VIII; fr. IX–X. Eastern Asia; locally in Ki., Ku. Moist places.

107. **MALVACEAE** Mallow Family 錦葵科 (Chin K'uei K'o)

Herbs, shrubs or trees, often stellate-pubescent, with *alternate simple* stipulate *lvs.*: infl. various: fls. often with a whorl of bracteoles below the calyx; *sepals* and petals 5; *stamens* usually numerous, *united into a tube* surrounding the style and joined at the base to the petals; carpels 2-several: *fr. dry*, the carpels separating at maturity or a loculicidal capsule. 82 genera with 1500 species, tropical and temperate regions; 10 genera and 25 species in China.

Key to the Genera

A. Fr. splitting at maturity into a ring of carpels.

Involucel present.
Involucel of 2 or 3 separate bracts: fls. pink or white, 0.8–4 cm. in diam ..... 1. *Malva*
Involucel 6-9-cleft: fls. variously colored..... 2. *Althaea*
Involucel none: fls. yellow, white or reddish, up to 6 cm. in diam. 3. *Abutilon*
AA. Fr. a loculicidal capsule.
Lobes of the involucel large and fringed: seeds densely long-hairy. 4. *Gossypium*
Lobes of the involucel entire: seeds glabrous or pilose.
Calyx spathe-like, splitting down one side and circumscissile, deciduous..... 5. *Abelmoschus*
Calyx regularly lobed, persistent ..... 6. *Hibiscus*

1. **Malva** Linn. Mallow 錦葵属 (Chin K'uei Shu; Beautiful Sunflower Genus)

Herbs with lobed or dissected lvs.: *fls.* pink or white, *subtended by* 3 or 2 small *distinct bracteoles*: *fr. a whorl of compressed* one-seeded *carpels which separate at maturity*. 30 species, in Eurasia and North Africa, widely naturalized; 3 in China. (Greek: *malakos*, soft, probably referring to the soft downy leaves of some species.)

Key to the Species

Fls. on slender pedicels 1.5–2.5 cm. long; bractlets of the involucel oblong to ovate-lanceolate; petals 3× the calyx ..... 1. *M. sylvestris*
Fls. crowded in the lf. axils; bractlets linear to linear-lanceolate; petals 2× the calyx ..... 2. *M. verticillata*

1. **Malva sylvestris** Linn. (G.M. 1001). Erect annual, to 1 m.; fls. rose-purple, on slender pedicels, VI–VIII; fr. VII–IX. Eurasia; locally in Ku. Planted, ornamental. Fig. 234
2. **Malva verticillata** Linn. Whorled Mallow 冬葵 (Tung K'uei; Winter Mallow) (G.M. 1001). Erect annual, to 2 m.; fls. pink, clustered in lf. axils, IV–V; fr. VI–VIII. Introduced from Europe; locally in Hup., Ki., Ku. Sometimes planted, ornamental.

2. **Althaea** Linn. Marsh Mallow 蜀葵属 (Shu K'uei Shu)

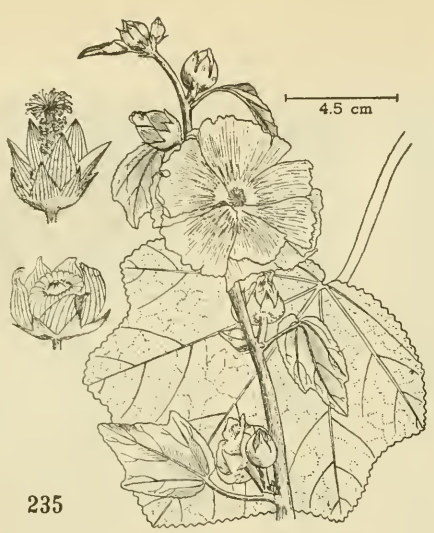
Tall coarse herbs: *fls.* variously colored, *2 cm. or more in diam.*; *bracteoles united* into a 6-9-cleft involucel: fr. as in *Malva*. 15 species, temperate zone; one cultivated and naturalized in China. (Greek: *althaino*, to heal.)

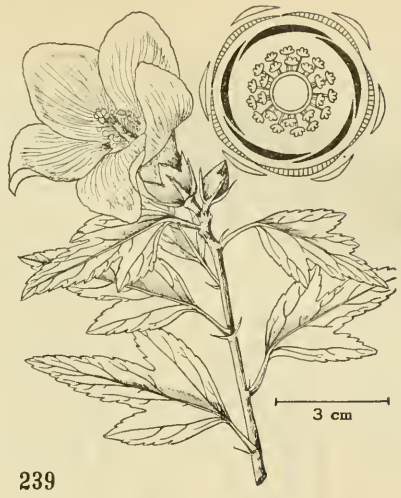
1. **Althaea rosea** Cav. Hollyhock 蜀葵 (Shu K'uei; Szechuan Mallow) (B.M. 658). Erect biennial, to 3 m.; fls. varicolored, IV–VII; fr. VIII; bracteoles united. Introduced from Persia; locally in An., Che., Ki., Ku. Planted, ornamental. Fig. 235.

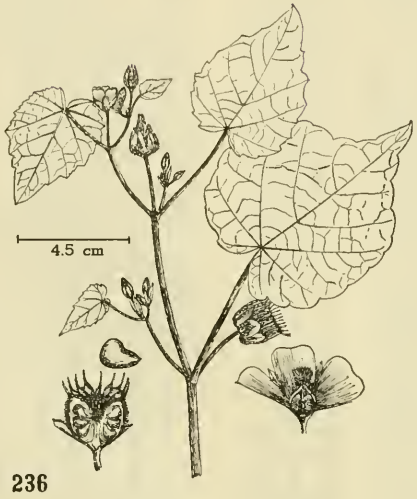
3. **Abutilon** Mill. Indian Mallow 苘麻属 (Mêng Ma Shu)

Herbs (ours) and shrubs with long-petiolate cordate lvs.: *fls.* yellow, white, or reddish, *without involucel*, up to 6 cm. in diam.; styles as many as the carpels: fr. as in *Malva*. 100 species, many warm countries; 2 in China. (Arabic: *abutilum*, name for a mulberry which has leaves resembling those of *Abutilon*.)

1. **Abutilon theophrasti** Medic. Velvet Leaf 苘麻 (Mêng Ma; Fritillary Hemp) (G.M. 1005). Erect annual, to 2 m.; fls. yellow, without involucel, VII–VIII; fr. IX–X. Introduced from India; locally in An., Ki., Ku. Cultivated, fiber. Fig. 236.







235. Althaea rosea
236. Abutilon theophrasti

237. Gossypium herbaceum
238. Abelmoschus manihot

239. Hibiscus syriacus
240. Firmiana simplex

4. **Gossypium** Linn. Cotton 棉属 (Mien Shu)

Stout herbs or shrubs with palmately lobed lvs.: fls. large, axillary, often yellow and purple, with large lobed and *fringed involucel*: *fr. a loculicidal* 3-5-valved *capsule* with densely *long-hairy seeds*. 30-40 species, tropical; 2 cultivated in China. (Latin: *gossypion*, from Arabic: *gothn*, a soft substance.)

Key to the Species

Bracteoles of the involucel more or less united below.
Bracteoles with 3 or 4 sharp teeth at the apex: lvs. not bearing a gland on the midnerve beneath ..... 1. *G. nanking*
Bracteoles cordate below and only slightly united, with 7-9 sharp teeth at the apex: lvs. bearing a large gland on the midnerve beneath.. 2. *G. herbaceum*
Bracteoles of the involucel quite free below ..... 3. *G. hirsutum*

1. **Gossypium nanking** Meyen Chinese Cotton (Watt 114). Annual, to 1 m.; fls. yellow, VII. fr. IX. Eastern Asia; locally in An., Che., Ku. Cultivated, fiber.
2. **Gossypium herbaceum** Linn. Levant Cotton 草棉 (Ts'ao Mien; Herbaceous Cotton) (B.M. 663). Annual, to 1 m.; fls. yellow, VIII–IX; fr. X. Southwestern Asia; locally in An., Ku. Cultivated, fiber. Fig. 237.
3. **Gossypium hirsutum** Linn. American Cotton 美棉 (Mei Mien) (B.M. 663). Annual, to 2 m.; fls. white, light yellow, pink or purple, VII–VIII; fr. X. Tropical America; locally in An., Ku. Cultivated, fiber.

5. **Abelmoschus** Medic. 秋葵属 (Ch'iu K'uei Shu)

Coarse erect herbs with large lvs. and large axillary fls: *bracteoles* 5 or more; *lobes entire*; *calyx spathe-like*, deciduous, splitting down one side and circumscissile: capsule 5-valved. 15 species, tropical; 2 cultivated in China. (Latin: *abelmoschus*, from Arabian: *abu-al-misk*, father of musk, referring to the odor of the seeds of some species.)

Key to the Species

Pod 15-20 cm. long, glabrous or nearly so: bractlets of the involucre linear. 1. *A. esculentus*
Pod 4-6 cm. long, hispid: bractlets ovate to oblong ..... 2. *A. manihot*

1. **Abelmoschus esculentus** (L.) Moench Okra 秋葵 (Ch'iu K'uei. Autumn Sunflower) (B.M. 664). Annual, to 2 m.; fls. yellow, VIII; fr. IX–X; pods 15–20 cm. long. Old World tropics; locally in Ku. Cultivated, vegetable.
2. **Abelmoschus manihot** (L.) Medic. (*Hibiscus manihot* Linn.) 黄蜀葵 (Huang Shu K'uei; Yellow Althaea) (B.M. 664). Annual, to 3 m.; fls. yellow or whitish, VIII; pods 4–6 cm. long. Eastern Asia; locally in Ku. Planted, ornamental. Fig. 238.

6. **Hibiscus** Linn. Rose Mallow 木槿属 (Mu Chin Shu)

Herbs, shrubs or trees: *bracteoles not fringed*; *calyx 5-lobed*, persistent: capsule 5-valved. 190 species, tropical; 5 in China. (Greek: *hibiskos*, the marsh mallow.)

Key to the Species

a. Plants herbaceous.
Stem spiny: upper lvs. digitately cleft into narrow serrate divisions: capsule bristly ..... 1. *H. cannabinus*

Stem not spiny: lvs. usually unlobed: capsule glabrous ..... 2. *H. moscheutos*
aa. Plants woody.
b. Mature lvs. pubescent or tomentose.
Calyx bracts narrowly oblong to linear: frtg. pedicels 5–10 cm. long, tomentose but not bristly ..... 3. *H. mutabilis*
Calyx bracts ovate: frtg. pedicels stout, 1.5–3 cm. long, brown-stellate-tomentose and pale-brown-bristly ..... 4. *H. paramutabilis*
bb. Mature lvs. glabrous or nearly so.
Staminal column long-exserted from the fl.: lvs. coarsely serrate but not lobed ..... 5. *H. rosa-sinensis*
Staminal column not exserted: at least some of the lower lvs. 3-lobed.
Calyx bracts lanceolate-oblong, exceeding the calyx: lvs. broad-cuneate-ovate ..... 6. *H. sinosyriacus*
Calyx bracts linear, about as long as the calyx: lvs. triangular-ovate or rhombic ..... 7. *H. syriacus*

1. **Hibiscus cannabinus** Linn. (B.M. 665). Erect herb, to 2 m.; fls. yellow or red, VII. Introduced from Old World tropics; locally in Ku. Cultivated, fiber.
2. **Hibiscus moscheutos** Linn. Garden Mallow (B.M. 665). Perennial herb, to 3 m.; fls. pink, VII; lvs. white-tomentose beneath. Introduced from eastern North America; locally in Ku. Planted, ornamental.
3. **Hibiscus mutabilis** Linn. Cotton Rose 木芙蓉 (Mu Fu Yung; Woody Hibiscus) (B.M. 666). Shrub or tree; fls. white to red, VIII–X; fr. IX–X. China; locally in Hun., Hup., Ki., Ku. Planted, ornamental.
4. **Hibiscus paramutabilis** Bailey (B.G. 1:109). Small tree; fls. lilac, VII; fr. VIII–IX. Central China; locally in Che., Hun., Ki. Planted.
5. **Hibiscus rosa-sinensis** Linn. Rose-of-China (B.M. 665). Shrub or tree, to 10 m.; fls. red, VI–VII. Asia; locally in Ku. Planted, ornamental.
6. **Hibiscus sinosyriacus** Bailey (B.G. 1:109). Shrub; fls. white and red, VII. Central China; locally in Ki. Planted.
7. **Hibiscus syriacus** Linn. Rose-of-Sharon 木槿 (Mu Chin; Fading-flower Wood) (B.M. 666). Shrub or tree, to 4 m.; fls. varicolored, VII–IX. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Planted, ornamental. Fig. 239.

108. **STERCULIACEAE** Sterculia Family 梧桐科 (Wu T'ung K'o)

Trees, shrubs or herbs with *alternate* simple (ours) or digitate stipulate *lvs.*: infl. axillary or terminal, usually clustered: fls. regular; sepals more or less united; petals 5 (or none), *stamens* mostly *numerous* and *united into a tube*; *anthers 2-celled*; carpels 1–5: fr. various. 50 genera with 750 species, tropical; 12 genera and 15 species in China.

Key to the Genera

Fls. in panicles; petals none: fr. a membranous follicle: trees ..... 1. *Firmiana*
Fls. in axillary clusters; petals present: fr. a loculicidally 5-valved capsule: herbs ..... 2. *Melochia*

1. **Firmiana** Marsigli 梧桐屬 (Wu T'ung Shu)

Deciduous trees with palmately lobed lvs.: infl. a terminal panicle: fls. unisexual, with androgynophore; sepals petaloid; *petals wanting*; carpels distinct at the base,

joined above into a single style, becoming membranous *follicles* which open long before the seeds are mature. 10 species in Asia, 1 in Africa, 2 in China. (After Karl Joseph von Firmian, 1718–1782, governor of Lombardy.)

1. **Firmiana simplex** (L.) W. F. Wight Phoenix Tree 梧桐 (Wu T'ung) (R.M. 630). Tree, to 15 m.; fls. VI–VII, petals wanting; fr. XI. China, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Planted, ornamental. Fig. 240.

2. **Melochia** Linn. 蕹葵属 (Yeh K'uei Shu)

Herbs (ours), shrubs or small trees with alternate serrate pinnately veined lvs. and perfect fls. in axillary clusters; sepals united at the base; *petals present*; *stamens 5, opposite the petals*, united into a tube below: ovary 5-celled, becoming a 5-valved loculicidally dehiscent *capsule*. 50 species, in warm regions; 1 in China. (From *Melochieh*, the Arabic name of the plant.)

1. **Melochia corchorifolia** Linn. (*M. concatenata* Linn.) 野路葵 (Yen Lu K'uei) (M.F. 330; F.H.E. 1:91). Herb, to 1 m.; fls. white to red, VII–VIII; fr. IX–X. Tropical countries; locally in Hup., Ki,, Ku. Field weed.

109. **ACTINIDIACEAE** Actinidia Family 猕猴桃科 (Mi Hou T'ao K'o)

Woody vines with alternate simple estipulate lvs.: infl. various: fls. perfect, polygamous or dioecious; stamens 10 or more; *anthers versatile, opening by slits*: *fr.* a berry or capsule, *many-seeded*. 3 genera with about 285 species, mostly Asiatic; all 3 genera and over 50 species in China.

1. **Actinidia** Lindl. 猕猴桃属 (Mi Hou T'ao Shu; Female-monkey-peach Genus)

Deciduous twining shrubs with small winter buds enclosed in the swollen base of the petiole: *stamens and styles numerous*: *fr. a* many-seeded *berry*: seeds reticulate-pitted. 36 species, most of them in China. (Greek: *actis*, ray, referring to the radiating styles.) Fig. 241.

Key to the Species

a. Lf. blades gray-stellate-tomentose beneath, broadly oblong, ovate to orbicular, truncate to emarginate, rarely acute or short-acuminate: pith lamellate: fr. subglobose to ellipsoid, densely brown-hairy, about 3 cm. across. ..... 1. *A. chinensis*

aa. Plants glabrous or pubescent, not stellate-hairy.

Fr. conspicuously spotted with gray or brown lenticels, 3-4×2-2.5 cm., glabrous: pith solid, or slightly lamellate at the center, light orange-colored: lf. blades obovate, ovate-elliptic or ovate-lanceolate, acuminate, obliquely rounded or cuneate at base, 5-13×2.5-6.5 cm. ..... 2. *A. callosa*

Fr. not conspicuously spotted with gray or brown lenticels.

Pith lamellate, usually brownish: petioles 3.5-8 cm. long: sepals 5 ..... 3. *A. arguta*

Pith solid, white: petioles 1-2 cm. long: calyx irregularly split into 2 or 3 sepals ..... 4. *A. valvata*

1. **Actinidia chinensis** Planch. 羊桃 (Yang T'ao; Goat Peach) (R.M. 632). Climbing shrub; fls. yellow, V–VI; fr. brown, VIII–IX. China; locally in An., Che., Hon., Hup., Ki., Ku. Forest.
2. **Actinidia callosa** Lindl. (R.M. 631). Climbing shrub; fls. white, VI; fr. spotted

241. Actinidia sp.
242. Camellia sinensis

243. Stewartia sinensis
244. Adinandra millettii

245. Eurya nitida
246. Hypericum chinense

with lenticels, IX. Java and Malaysia to China; locally in An., Che., Hun., Ki. Forest.

3. **Actinidia arguta** (S. & Z.) Planch. ex Miq. (AA.J. 33:31). Climbing shrub; fls. white, VI–VII; fr. greenish yellow, VIII–X. China, Korea, Japan; locally in An., Che., Hon., Ku. Brushland, forest.
4. **Actinidia valvata** Dunn (AA.J. 33:23). Climbing shrub; fls. white, fragrant, V–VI; fr. VIII–IX. Eastern China; locally in An., Che., Ki., Ku. Brushland, forest.

110. THEACEAE Tea Family 山茶科 (Shan Ch'a K'o)

Trees or shrubs with alternate simple estipulate lvs.: *fls.* regular, usually perfect, axillary and *solitary*, sometimes in clusters; sepals 5–7; petals 5–4, usually more or less united; stamens mostly numerous; anthers opening longitudinally, rarely by a pore: *fr. a woody capsule*, sometimes indehiscent. 30 genera with 500 species, in tropical and subtropical regions; 10 genera and 60 species in China.

Key to the Genera

A. Fr. dehiscent: anthers versatile.
  Seeds large, subglobose or angular, not compressed ..... 1. *Camellia*
  Seeds smaller, compressed, often winged.
    Capsule 5-angled, without columella but with the carpels tapering to a stout beak ..... 2. *Stewartia*
    Capsule subglobose, flattened on top, with a short columella, but without beak ..... 3. *Schima*
AA. Fr. indehiscent: anthers basifixed.
  B. Plants hermaphroditic: pedicels longer than the fls.
    Anthers glabrous: stigmas sessile ..... 4. *Ternstroemia*
    Anthers pilose: style elongated.
      Fls. solitary, conspicuously 2-bracteate: persistent calyx about half the length of the fr. ..... 5. *Adinandra*
      Fls. fascicled: bracts obsolete: calyx lobes shorter than half the length of the fr. ..... 6. *Cleyera*
  BB. Plants dioecious: pedicels shorter than the fls. ..... 7. *Eurya*

1. **Camellia** Linn. Tea 茶属 (Ch'a Shu)

Evergreen shrubs or trees with short-petioled coriaceous lvs.: fls. white to red; outer *stamens* united, *the inner* ones *free*; *anthers versatile*: *capsule dehiscent*: *seeds* few, *large*, *globose*. 45 species, in Asia; 25 in China. (After Georg Joseph Kamel, 1661–1706, latinized Camelius, Jesuit Priest in the Philippines.)

Key to the Species

a. Sepals persistent; fls. pedicellate.
  b. Ovary villous.
    Capsule subglobose, 1.5 cm. in diam.: lvs. caudate-acuminate, 2–6 cm. long: not cultivated ..... 1. *C. caudata*
    Capsule 3-lobed, 2–3 cm. in diam.: lvs. acute or briefly acuminate: cultivated ..... 2. *C. sinensis*
  bb. Ovary glabrous.
    Sepals and subtending bracts glabrous: brts. glabrous..... 3. *C. cuspidata*
    Sepals and subtending bracts silky-hairy at tip: brts. pubescent 4. *C. fraterna*
aa. Sepals deciduous; fls. sessile.

Lvs. small, elliptic-obovate, rounded to obtuse, 1.5–4 cm. long; margin finely serrate from middle to apex, entire towards the cuneate base ..... 5. *C. microphylla*
Lvs. large, elliptic to ovate, acute or acuminate at tip, 3–9 cm. long; margins serrate or nearly entire: ovary hirsute.
Fls. 7–12 cm. across, usually red or pink, occasionally white; ovary and styles glabrous ..... 6. *C. japonica*
Fls. 3–5 cm. across, white; ovary villous ..... 7. *C. drupifera*

1. **Camellia caudata** Wall. (H.F. 1:293). Shrub or small tree; fls. white, IV; fr. VIII–IX, subglobose. Himalaya, southern China; Indo-China; locally in Hu., Ki. Brushland.
2. **Camellia sinensis** (L.) Ktz. Tea 茶 (Ch'a) (B.M. 672). Shrub or tree, to 10 m.; fls. white, X; fr. VIII–IX, 3-lobed. India, China; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, leaves. Fig. 242.
3. **Camellia cuspidata** (Kochs) Veitch 山茶 (Shan Ch'a; Mountain Tea) (R.M. 634). Shrub, to 2 m.; fls. white, IV–VI; fr. VIII–IX. China; locally in An., Che., Hun., Ki. Forest.
4. **Camellia fraterna** Hance (ASNP IV. 18:218). Shrub, to 5 m.; fls. white, IV; fr. VIII–IX. China; locally in An., Che., Hup. Brushland.
5. **Camellia microphylla** (Merr.) Chun (*Thea microphylla* Merr.) (AA.J. 8:9). Shrub; fls. IV; fr. VIII–IX. China; locally in An., Ki. Forest.
6. **Camellia japonica** Linn. 山茶花 (Shan Ch'a Hua; Mountain Tea-flower) (R.M. 633). Shrub or tree, to 15 m.; fls. red, pink or white, IV–VI; fr. IX–X. China, Japan; locally in An., Che., Ku. Planted, ornamental.
7. **Camellia drupifera** Lour. (*Thea oleosa* Lour.; *C. oleifera* Abel) 油茶 (Yu Ch'a) (M.L. 266). Shrub or tree; fls. white, X; fr. 25–35 mm. long, VIII–IX. China, Indo-China; locally in An., Che., Hun., Hup., Ki., Ku. Forest and cultivated, seeds.

2. **Stewartia** Linn. 紫莖属 (Tzŭ Hêng Shu)

Deciduous shrubs or trees with *smooth bark* and short-petioled membranous lvs.: *stamens united and joined to the petals* at the base: capsule *angular, with sharp beak, dehiscent*: *seeds* few, *flattened*, often narrowly winged. 6 species, eastern Asia; one in China. (After John Stuart, 1713–1792, Earl of Bute, a patron of botany.)

1. **Stewartia sinensis** Rehd. & Wils. 紫莖 (Tzŭ Hêng; Purple Stem) (R.M. 635). Shrub or tree, to 10 m.; fr. VIII–IX; seeds winged. Central China; locally in An., Che., Ki., Hup. Forest. Fig. 243.

Stewartia gemmata Chien & Cheng (Sc. C. 6:66) has been described to include forms with more pubescent leaves and fruits than are found in the type of *S. sinensis* (Wilson 2148 from Hupeh), but the degree of hairiness of leaves and fruits appears to vary greatly throughout the range. These plants are believed to occur more commonly in Kiangsi, Anhwei and Chekiang than in Hupeh.

3. **Schima** Reinw. ex Blume 木荷属 (Mu Ho Shu)

Evergreen trees or shrubs: lvs. simple, crenate or serrate: peduncles axillary, usually 1-fld.: fls. showy; sepals and petals 5; petals white, connate at base; stamens numerous, joined to the base of the petals; ovary 4–6-celled: *capsule* woody, subglobose, *truncate at top*, with short columella, dehiscent; *seeds* flattened, reniform, *with a*

narrow *membranous wing* nearly all round. 18 species, in southeastern Asia, Philippines and Malaya; 8–10 in China. (Greek: *skiasma*, shading, alluding to thick leafy crown of *S. noronhae*.)

1. **Schima superba** Gard. & Champ. (*S. confertiflora* Merr.) 木荷 (Mu Ho; Woody Nelumbo) (I.P.S. 1:42; K.B. 1936:497). Tree, to 16 m.; fls. white, VI; fr. IX. South China; locally in An., Che., Hun., Ki. Forest.

4. **Ternstroemia** Linn. f. 厚皮香属 (Hou P'i Hsiang Shu)

Evergreen trees or shrubs with coriaceous lvs.; *peduncles long*, 1-fld., with 2 bracts near the fl.: fls. perfect; sepals and petals 5; *anthers basifixed, glabrous*; *stigmas sessile*: fr. indehiscent. 25 species, tropical Asia and America; 2 in China. (Named for Christopher Ternstrom, 1703?–1747, Swedish naturalist, sent by Linnaeus to study the flora of China.)

Key to the Species

Fr. subglobose, 15 mm. in diam., with beak 2 mm. long: lvs. coriaceous, oblong-elliptic or narrowly obovate, 6–14 cm. long; lateral nerves not evident; usually not darkened in drying..... 1. *T. gymnanthera*

Fr. conical, 8 mm. in diam., 10 mm. long, with beak 4 mm. long: lvs. chartaceous, oblong-elliptic or narrowly oblong-ovate, 5–10 cm. long; lateral nerves apparent; usually darkened in drying ..... 2. *T. nitida*

1. **Ternstroemia gymnanthera** (W. & A.) Bedd. 厚皮香 (Hou P'i Hsiang; Thick-bark Fragrance) (B.M. 674). Shrub, to 2 m.; fls. cream-white, V. Eastern Asia; locally in Ki. Forest.
2. **Ternstroemia nitida** Merr. (AA.J. 8:10). Tree, 10–13 m. high; fls. white, VI–VII; fr. IX–X. Southeastern China; locally in An., Che., Ki. Forest.

5. **Adinandra** Jack 楊桐属 (Yang T'ung Shu; Poplar-Aleurites Genus)

Evergreen trees: *peduncles 1-fld.*, with 2 bracts near the fls.; sepals and petals 5; *calyx* persistent, about *1/2×the fr.*; *anthers hairy*; *style elongated*: fr. globose. 10 species, tropical Asia and Africa; 3 in China. (Greek: *adinos*, pressed together, and *andros*, man, referring to the stamens which are very closely crowded.)

1. **Adinandra millettii** (H. & A.) Benth. & Hook. f. (*A. drakeana* Franch.) 黃瑞木 (Huang Tuan Mu; Yellow-erect Tree) (AA.J. 28:11). Shrub; fls. white, V, style elongated; fr. VIII–IX. Eastern Asia; locally in An., Che., Ki. Forest. Fig. 244.

6. **Cleyera** DC. 紅淡比属 (Hung Tan Pi Shu)

Trees or shrubs: *infl.* with short often *fascicled* and *ebracteate peduncles*; sepals and petals 5; calyx less than 1/2×the fr.; anthers hairy: fr. indehiscent. One species, tropical Asia and America. (Named for Andreas Cleyer ? –1697 or –98, German physician and soldier of fortune.)

1. **Cleyera japonica** Thunb. (B.M. 674). Shrub, to 3 m.; fls. white, VI; anthers hairy; fr. IX–X. Eastern Asia; locally in An., Che., Hun., Ki., Ku. Forest.

7. **Eurya** Thunb. 柃木属 (Ling Mu Shu)

Hermaphroditic, polygamous or *dioecious* (ours) evergreen shrubs or trees: fls.

solitary or in axillary clusters, on *pedicels shorter than the fls.*; sepals and petals 5; anthers glabrous, basifixed: fr. a berry. 35 species, warm parts of Asia and America; 15 in China. (Greek: *eurus*, broad, referring to the broad sepals and petals.)

1. **Eurya nitida** Korth. (*E. japonica* Thunb. var. *nitida* (Korth.) Dyer) 柃木 (Ling Mu) (H.F. 1:284). Shrub, to 4 m.; fls. white, X. Southeastern Asia, Philippines, East Indies; locally in An., Che., Hun., Hup., Ki., Ku. Forest. Fig. 245.

111. GUTTIFERAE St. John's Wort Family 金絲桃科 (Chin Ssŭ T'ao K'o)

Hermaphroditic, polygamous or dioecious herbs, shrubs or trees with *opposite lvs.* and solitary or clustered regular fls.: sepals and petals 2–6, or more numerous; *stamens many*, distinct, monadelphous or *united in bundles* (ours); ovary superior, 1–many-celled; styles 1–many, distinct or united: fr. a dehiscent capsule or an indehiscent berry or drupe. About 45 genera with 750 species, widely distributed; 4 genera and 25 species, in China.

1. Hypericum Linn. St. John's Wort 金絲桃属 (Chin Ssŭ T'ao Shu)

Herbs or shrubs with *glandular-dotted lvs.*: fls. bisexual, yellow, pink or purple; sepals 5; petals 5, convolute in the bud; *stamens* numerous, usually joined *in* 5 *bundles*: fr. usually a capsule. 200 species, in the northern hemisphere; 20 in China. (Greek: *hypo*, under or among, and *ereikê*, heath or heather.)

Key to the Species

a. Styles 5: capsule 5-celled: fls. large, 3–6 cm. across.
  Petals persistent, rolling into stiff rods when dry: stout perennials, somewhat woody at the base ..... 1. *H. ascyron*
  Petals deciduous: shrubs.
    Styles united into a slender column 15–20 mm. long, 5-parted at the top; filaments about 20 mm. long: lvs. reticulate and sometimes glaucous beneath ..... 2. *H. chinense*
    Styles free, about 5 mm. long; filaments about 10 mm. long: lvs. glaucous beneath, not reticulate ..... 3. *H. patulum*

aa. Styles 3: capsule 3-celled: fls. smaller, not over 2 cm. in diam.: herbs.
  b. Lvs. sessile or on very short petioles, not connate-perfoliate.
    Lvs., or most of them, ovate, 2–10 mm. long: fls. small, 4–8 mm. in diam.: slender annuals, 5–30 cm. high ..... 4. *H. japonicum*
    Lvs. oblong or ovate-elliptic-oblong, 10–30 mm. long; fls. larger, 15–20 mm. in diam.: tough, sometimes bushy herbs, 30–50 cm. high.
      Sepals ovate: lvs. ovate-elliptic-oblong, 1–3 cm. long; with mostly small or obsolete glandular dots and a few large black dots: stems erect, unbranched or sparsely brg. above ..... 5. *H. attenuatum*
      Sepals lanceolate: lvs. elliptic-linear-oblong, 1–1.5 cm. long, with large black glandular dots: stems profusely brg. .. 6. *H. perforatum*
  bb. Lvs. connate-perfoliate, 4–6 cm. long: capsule bearing rows of oval resiniferous vescicles ..... 7. *H. sampsoni*

1. **Hypericum ascyron** Linn. 黃海棠 (Huang Hai T'an; Yellow Crab-apple) (R.M. 638). Erect herb, to 1.5 m.; fls. yellow, V–VII; fr. VIII–X. Eastern North

America and eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Grassland.

Hypericum hemsleyanum Lévl. & Vant. from Kiangsu (BSBF 54:592), closely related to *H. ascyron*, differs in having ovate and not lanceolate lvs.

2. **Hypericum chinense** Linn. 金絲桃 (Chin Ssŭ T'ao; Gold-thread Peach) (R.M. 639). Shrub, to 2 m.; fls. yellow, IV–IX. China, Japan; locally in An., Hup., Ki., Ku. Woodland shade, cultivated, ornamental. Fig. 246.
3. **Hypericum patulum** Thunb. (*H. argyi* Lévl. & Vant.) (R.M. 638; R.B. 463). Spreading shrub; fls. yellow, VI; fr. VIII. Japan, China, Himalayas; locally in Che., Ku. Woodland and planted, ornamental.
4. **Hypericum japonicum** Thunb. 地茸草 (Ti Êrh Ts'ao; Earth-ear Herb) (Mak.F. 323). Erect herb, to 3 dm.; fls. yellow, small, 2–10 mm. across, VIII. Australia, New Zealand to eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Damp meadows.
5. **Hypericum attenuatum** Choisy 趕山鞭 (Kan San Pien; To-drive-with-a-mountain-whip) (Don 1:606). Erect herb, to 8 dm.; fls. yellow, VI–VIII. Eastern Asia; locally in An., Hun., Ki., Ku. Grassland.
6. **Hypericum perforatum** Linn. (G.M. 1010). Brg. herb, to 1 m.; fls. yellow, V–VII; fr. VIII–IX. Eurasia; locally in Hup., Ki. Grassland.
7. **Hypericum sampsoni** Hance 元寶草 (Yuan Pao Ts'ao; Silver-ingot Herb) (Mak.F. 326). Erect herb, to 1 m.; fls. yellow, VI. China; locally in An., Hun., Hup., Ki., Ku. Grassland.

112. TAMARICACEAE Tamarisk Family 檉柳科 (Ch'êng Liu K'o)

Shrubs or small *trees* with *simple scale-like alternate lvs.*: *fls. regular*, *bisexual*, solitary or in terminal clusters; sepals and petals 4 or 5; *stamens 1 or 2×the petals*, inserted *on a disk*; ovary superior, 1-celled: fr. a dehiscent capsule; seeds densely bearded. 4 genera with 100 species, from Africa and the Mediterranean region to eastern Asia; 2 genera and 6 species in China.

1. **Tamarix** Linn. 檉柳属 (Ch'êng Liu Shu)

Bushes or small trees with amplexicaul or sheathing lvs. and white or pink fls.; *stamens free*, (4,5, 8 or 10), with apiculate anthers; *styles 3–4*, dilated into the stigmas. 20 species, distributed as for the family; 4 in China. (Latin: *tamarix*, the tamarisk.)

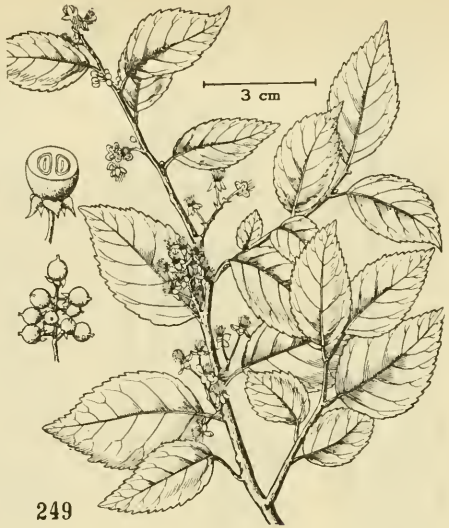
1. **Tamarix chinensis** Lour. Chinese Tamarisk 檉柳 (Ch'êng Liu) (R.M. 644). Shrub or tree, to 5 m.; fls. pink, VII–IX; lvs. scale-like. China; locally in Ku. Planted, ornamental. Fig. 247.

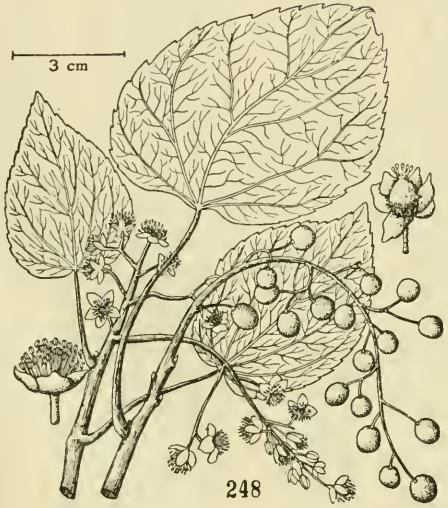
113. VIOLACEAE Violet Family 菫菜科 (Chin Ts'ai K'o)

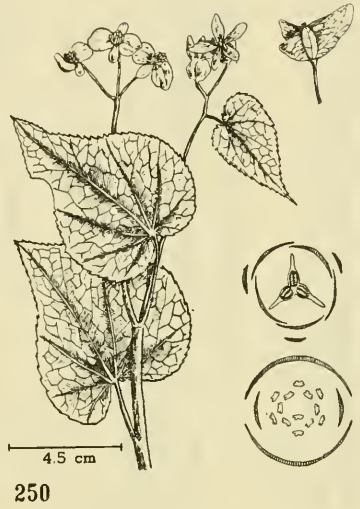
Herbs (ours) or shrubs with alternate or basal stipulate lvs.: *fls.* axillary, usually *irregular* and bisexual, on 2-bracted peduncles; *sepals* and petals *5*; stamens 5, often joined in a ring around the ovary; ovary 1-celled, with usually *3* parietal *placentae*: fr. a dehiscent capsule or berry-like. 16 genera with 850 species, widely distributed; 2 genera and 50 species in China.

1. **Viola** Linn. Violet 菫菜属 (Chin Ts'ai Shu)

Perennial herbs with persistent often lf.-like stipules: fls. of 2 kinds; those in the spring with showy petals; those in the summer cleistogamous, apetalous and producing many seeds: *calyx lobes drawn back into a fold at the base* (sometimes called







247. Tamarix chinensis
248. Idesia polycarpa

249. Xylosma congestum
250. Begonia evansiana

251. Daphne genkwa
252. Edgeworthia chrysantha

an appendage); the lower petal spurred; the 2 lower stamens with nectar-bearing appendages which extend into the spur. 300 species, in temperate regions; 50 in China. (Latin: *viola*, the violet.)

Key to the Species

a. Plants without evident stems or stolons, acaulescent.
  b. Lvs. not deeply lobed or divided.
    c. Lvs. reniform, ovate, or triangular-ovate, cordate at base.
      Lvs. glabrous or nearly so ..... 1. *V. cordifolia*
      Lvs. softly pubescent ..... 2. *V. rossii*
    cc. Lvs. elongate-triangular, oblong or ovate, sometimes subsagittate at base with rounded lobes, not cordate.
      Fls. white; peduncles often exceeding lvs. ..... 3. *V. lactiflora*
      Fls. purple or violet; peduncles mostly about equal to the lvs. ..... 4. *V. philippica*
  bb. Lvs. multicleft into lanceolate or linear divisions ..... 5. *V. chaerophylloides* var. *sieboldiana*

aa. Plants with evident stems or stolons.
  d. Stems creeping and stoloniferous.
    e. Stipules entire or nearly so: fls. purple or lilac.
      Lvs. small, 15–30 mm. wide: fls. small, about 10 mm. long ..... 6. *V. alata* ssp. *verecunda*
      Lvs. large, 30–100 mm. wide: fls. larger, 15–20 mm. long.
        Lvs. glabrous, broadly triangular-cordate or reniform-cordate: flls. not fragrant ..... 7. *V. moupinensis*
        Lvs. more or less pubescent, ovate-cordate: fls. fragrant ..... 8. *V. odorata*
    ee. Stipules cleft or incised, at least at the base.
      f. Petioles not broadly winged.
        Plants glabrous or nearly so.
          Lvs. not glandular ..... 6. *V. alata* ssp. *verecunda*
          Lvs. glandular beneath ..... 9. *V. kiangsiensis*
        Plants more or less clothed with flat silvery hairs ..... 10. *V. canescens*
      ff. Petioles broadly winged above; wings tapering below ..... 11. *V. diffusa* var. *brevisepala*

  dd. Stems erect or ascending.
    g. Stipules not large and herbaceous.
      h. Lf. blades triangular-ovate, cuneate at base; stipules remotely laciniate ..... 12. *V. stewardiana*
      hh. Lf. blades cordate, or rarely truncate, at base.
        Stipules strongly laciniate or fimbriate.
          Rhizome bearing a rosette of lvs. at the top from which slender elongated leafy stems develop: fls. large, about 20 mm. long, pale blue ..... 13. *V. grypoceras*
          Rhizome without a leaf-rosette, producing

stout erect leafy stems: fls. smaller, 10–12 mm. long, white or pale blue ..... 14. *V. micrantha*

Stipules remotely cleft or nearly entire: fls. small, 7–10 mm. long, white ..... 15. *V. triangulifolia*

gg. Stipules large and herbaceous, pinnately cut near the base: fls. large, to 5 cm. in diam. ..... 16. *V. tricolor* var. *hortense*

1. **Viola cordifolia** W. Bckr. (K.B. 1929:201). Stemless herb; fr. X. China; locally in Ku. Shaded banks.
2. **Viola rossii** Hemsl. (F.H.E. 1:54). Stemless herb. China, Korea; locally in Ki., Ku.
3. **Viola lactiflora** Nakai (*V. limprichtiana* W. Bckr.) (Bo.Ma.T. 28:329). Stemless herb, to 10 cm.; fls. white, III. Korea, China; locally in Ku. Moist grassland.
4. **Viola philippica** Cav. Chinese Violet 紫花地丁 (Tzŭ Hua Ti Ting; Purple-flowered Earth-nail) (Ph.J. 19:719). Stemless herb, to 1.5 dm.; fls. purple, IV. East Indies, Philippines, eastern Asia; locally in An., Che., Ki., Ku. Damp grassland.

Becker has described two subspecies of *V. philippica* distinguished mainly by their leaf form, namely:

4a. **Viola philippica** Cav. ssp. **munda** W. Bckr. (Ph.J. 19:722). Leaf blades mostly lanceolate or oblong.

4b. **Viola philippica** Cav. ssp. **malesica** W. Bckr. (Ph.J. 19:720). Leaf blades broader and somewhat shorter.

Handel-Mazzetti (Symb. Sin. 7:375) has recognized these subspecies. The present writer has found such great variation in leaf form among the specimens of *V. philippica* that he has had difficulty in separating them.

5. **Viola chaerophylloides** (Reg.) W. Bckr. var. **sieboldiana** (Max.) Mak. (*V. pinnata* Linn. var. *sieboldiana* Maxim.) 胡葷草 (Hu Chin Ts'ao; Mongolian Violet) (Be.Bo.Ce. 40(2):121). Stemless herb, to 3 dm. Northeastern Asia; locally in Ki. Damp. woodland.
6. **Viola alata** Burgsd. ssp. **verecunda** (A. Gray) W. Bckr. (Be.Bo.Ce. 34(2):227). Creeping herb with slender stolons; fls. pale violet, III–IV, 10 mm. long. Northeastern Asia; locally in Hun. Ditch banks and swampy fields.
7. **Viola moupinensis** (Franch.) Franch. (Fra.D.H. 20). Stemless herb, to 1.5 dm.; fls. white, not fragrant, IV. China; locally in Ku. Grassland.
8. **Viola odorata** Linn. Garden Violet (B.M. 685). Tufted stoloniferous herb; fls. violet to white, fragrant. Introduced from Europe; locally in Ku. Planted, ornamental.
9. **Viola kiangsiensis** W. Bckr. (Fe.R. 21:321). Stoloniferous herb; fls. pale violet, IV. China; locally in Ki. Shady places.
10. **Viola canescens** Wall. (Don 1:324). Stoloniferous herb, to 1 dm.; fls. purple. Eastern China; locally in Ku. Damp ground.
11. **Viola diffusa** Ging. var. **brevisepala** W. Bckr. Wood Violet (K.B. 1928:251). Stoloniferous herb; fls. lavender, IV; stipules lanceolate. East-central China; locally in An., Hun., Ki., Ku. Damp woodland.
12. **Viola stewardiana** W. Bckr. (Fe.R. 21:237). Erect herb, to 2 dm.; fr. VII. East-central China; locally in An., Ki. Brushland, meadows.

13. **Viola grypoceras** A. Gray 紫花堇菜 (Tzŭ Hua Chin Ts'ai; Purple-flowered Violet) (Mak.F. 311). Weak herb, to 2 dm.; fls. pale blue, 20 mm. long, IV. Eastern Asia; locally in An., Ki., Ku. Damp woodland.
14. **Viola micrantha** Turcz. (Be.Bo.Ce. 34(2):380). Erect herb, 3 dm. high; fls. white or pale blue, 10 mm. long, IV; fr. VII. Northeastern Asia; locally in Ki., Ku. Shaded streambanks.
15. **Viola triangulifolia** W. Bckr. (K.B. 1929:202). Erect herb, 2–3 dm. high; fls. white, IV. East-central China; locally in An., Hun., Ki. Moist banks.
16. **Viola tricolor** Linn. var. **hortensis** DC. Pansy 三色菫 (San Sê Chin) (B.M. 686). Tufted erect herb, to 1.5 dm.; fls. various. Introduced from Europe; locally in Ku. Planted, ornamental.

114. FLACOURTIACEAE Flacourtia Family 大風子科 (Ta Fêng Tzŭ K'o; Gynocardia-seed Family)

Trees or shrubs with alternate simple lvs.: stipules deciduous: *fls.* in cymes, regular, perfect or *unisexual*; sepals 2–6, persistent; petals sometimes wanting; stamens numerous or few; staminodes occasionally present; ovary superior or nearly so, 1-celled, with 3–5 parietal placentae: *fr.* usually *a* capsule or *berry* (ours). 84 genera with 850 species; 9 genera and 16 species in China.

Key to the Genera

Fls. in large terminal panicles: lvs. deciduous: berry many-seeded..... 1. *Idesia*
Fls. in axillary racemes: lvs. evergreen: berry 2-3-seeded ..... 2. *Xylosma*

1. **Idesia** Maxim. 山桐子屬 (Shan T'ung Tzŭ Shu)

Dioecious or polygamous *deciduous* tree with *fls. in* large *terminal panicles*: sepals usually 5; petals wanting; staminate fls. with numerous stamens and a rudimentary pistil; styles usually 5: *fr.* a fleshy *many-seeded* berry. One species, in eastern Asia. (For Eberhard Ysbrant Ides, 1660–1695?, a Dutch traveller in China.)

1. **Idesia polycarpa** Maxim. 山桐子 (Shan T'ung Tzŭ; Mountain Aleurites) (R.M. 653). Tree, to 15 m.; fls. olive-yellow, V–VI; fr. brown, IX–XI. Southern Japan, central and western China; locally in An., Che., Hun., Hup., Ki. Forest. Fig. 248.

1a. **Idesia polycarpa** var. **typica** Diels. Lvs. barbate or subglabrous beneath. (Di. F. 478).
1b. **Idesia polycarpa** var. **vestita** Diels. Lvs. softly pilose beneath. (R.M. 653).

2. **Xylosma** Forst. f. 柞木屬 (Tso Mu Shu)

Dioecious or polygamous *evergreen* trees or shrubs, often spiny, with *fls. in axillary racemes*, but without stipules: sepals 4–5; petals wanting; ovary superior, surrounded by a glandular disk: *fr.* a *2–3-seeded* berry. 50 species, mostly tropical; 4–5 in China. (Greek: *xylon*, wood; and *osmē*, smell.)

1. **Xylosma congestum** (Lour.) Merr. (*X. racemosum* Miq.) 柞木 (Tso Mu) (Lee 839). Tree, to 15 m.; fls. white or yellow, IX–XI; fr. black, V. Japan, China; locally in An., Che., Hun., Hup., Ki. Forest. Fig. 249.
1a. **Xylosma congestum** var. **pubescens** (R. & W.) Rehd. (Lee 841). This year's brs. densely pubescent. China; locally in Che., Hun., Hup., Ki.

115. **STACHYURACEAE** Stachyurus Family 旌節花科 (Ching Chieh Hua K'o)

Heterogamous or dioecious *shrubs or small trees* with *alternate* serrate *lvs.*; stipules small, caducous: *fls.* regular, *in pendulous axillary racemes*; sepals and petals 4; *stamens* 8, *distinct*; ovary superior, incompletely 4-celled; stigma 4-lobed: *fr. a* leathery *berry* with many arillate seeds. Only one genus, in Asia.

1. **Stachyurus** Sieb. & Zucc. 旌節花属 (Ching Chieh Hua Shu; Lofty-banner Flower Genus)

Characters of the family. 5–6 species, Asiatic; 5 in China. (Greek: *stachys*, spike, and *urus*, tail, referring to the shape of the inflorescence.)

1. **Stachyurus chinensis** Franch. 水涼子 (Shui Liang Tzŭ; Cool-water Tree) (R.M. 654). Shrub, to 4 m.; fls. greenish, IV; fr. yellow, tinged red, VII–VIII. China; locally in An., Che., Hun., Hup., Ki. Forest.

116. **PASSIFLORACEAE** Passion Flower Family 西番蓮科 (Hsi Fan Lien K'o)

Herbaceous (ours) or somewhat woody *vines*, *climbing by tendrils*: *lvs. alternate*, *simple*, entire or lobed, mostly stipulate: *fls. regular*, perfect or unisexual; calyx 3–5-lobed, sometimes petaloid; petals as many as the calyx lobes and alternate with them, or none; a corona, an outgrowth of the receptacle or calyx tube, usually present; *stamens 5* alternate with the petals; the filaments united and joined to the stalk of the *1-celled supersior stipitate ovary*; styles usually 3: fr. berry-like or a 3-valved capsule. 11 genera with 600 species, in warm regions; one genus and 5–10 species in China.

1. **Passiflora** Linn. Passion Flower 西番蓮属 (Hsi Fan Lien Shu; Western Lotus Genus)

Fls. perfect, large and showy, solitary or in racemes; bracteoles 3; petals as long as the calyx lobes; corona of many segments borne on the calyx tube, and a small basal corona surrounding the lower end of the gynophore: ovary with *3 placentae*: *fr. fleshy*, with arillate seeds. 300 species, mostly of tropical America; 5–10 in China. (Latin: *flos passionis*, passion flower.)

1. **Passiflora incarnata** Linn. Maypop (B.M. 691). Perennial vine; fls. white and purple or pink; fr. fleshy. Introduced from eastern United States; locally in Ku. Planted, ornamental.

117. **BEGONIACEAE** Begonia Family 秋海棠科 (Ch'iu Hai T'ang K'o)

Succulent *monoecious herbs* (ours) or shrubs with alternate oblique lvs.: fls. more or less regular; the staminate opening first; *sepals* and petals *2*, all petaloid; stamens many; ovary inferior (half superior in *hildebrandia*) 2–3-celled: *fr. an* angled or winged *capsule* (rarely a berry) with many fine seeds. 5 genera with 800 species, in moist tropical countries (except Australia); one genus and 15 species in China.

1. **Begonia** Linn. 秋海棠属 (Ch'iu Hai T'ang Shu)

Perianth conspicuous and slightly irregular: *ovary inferior*. 390 species, distributed as for the family; 15 in China. (After Michel Bégon, 1638–1710, French patron of botany and superintendent at Santo Domingo.)

Key to the Species

Plants herbaceous, succulent.
- Plant large, 6 dm. or more high, with tuberous rootstock: lvs. 8–15 cm. long; stipules ovate-lanceolate, deciduous: wings of the capsule unequal ..... 1. *B. evansiana*
- Plant smaller, with fibrous roots: lvs. smaller; stipules ovate, large and dry: wings of capsule equal ..... 2. *B. semperflorens*

Plant becoming woody, tall: lvs. 10–15 cm. long, profusely white-speckled above ..... 3. *B. argento-guttata*

1. **Begonia evansiana** Andr. 秋海棠 (Ch'iu Hai T'ang; Autumn Flowering-apple) (B.M. 696). Succulent herb; fls. pink, VIII. China, Japan; locally in An., Ki., Ku. Planted, ornamental. Fig. 250.
2. **Begonia semperflorens** Link & Otto 四季海棠 (Ssŭ Chi Hai T'ang; Four-seasons Flowering-apple) (B.M. 698). Succulent herb; fls. red to white, II. Introduced from Brazil; locally in Ku. Planted, ornamental.
3. **Begonia argento-guttata** Lemoine 麻葉海棠 (Ma Yeh Hai T'ang; Spotted-leaf Flowering-apple) (B.M. 697). Suffrutescent; fls. pink. Garden origin; locally in Ku. Planted, ornamental.

118. **CACTACEAE** Cactus Family 仙人掌科 (Hsien Jen Chang K'o; Fairy-palm Family)

Succulent *green-stemmed usually leafless* perennials *with spines* arising from small cavities (areolae): *fls.* usually *bisexual*, solitary and showy, perigynous or *epigynous*; petals few or numerous; stamens usually many; ovary 1-celled; style 1: *fr. a berry*, often spiny. 100–120 genera with 1,200–1,800 species, in tropical and subtropical America. A few cultivated or naturalized in China.

1. **Zygocactus** K. Schum. 蟹足霸王樹属 (Hai Tsu Pa Wang Shu Shu)

Flat-stemmed, short-jointed mostly spineless cacti with conspicuous *irregular fls.* Growing naturally as epiphytes on trees. One species cultivated in China for its flowers. (Latin: *zygo* and cactus; cactus with zygomorphic flowers.)

1. **Zygocactus truncatus** Schum. Christmas Cactus 蟹足霸王樹 (Hsieh Tsu Pa Wang Shu; Crab-footed Great King Shrub) (B.M. 705). Succulent, vinelike; fls. red, irregular; fr. red. Introduced from Brazil; locally in Ku. Planted, ornamental.

119. **THYMELAEACEAE** Mezereum Family 瑞香科 (Shui Hsiang K'o)

Trees, *shrubs* (ours) or herbs *with tough* acrid *bark* and simple entire usually exstipulate lvs.; *fls. regular*, perfect or sometimes unisexual, often *apetalous* (ours); *calyx* tubular, often *corolline*, 4–5-lobed; stamens as many as or 2×the calyx lobes; anthers opening by long slits; *ovary superior*: fr. *1-seeded.* 40 genera with 500 species, widely distributed; 6 genera and 50 species in China.

Key to the Genera

Fls. in terminal or lateral heads or clusters, subtended by involucrate bracts: lvs. alternate.
- Stigma capitate, large, sessile; disk wanting ..... 1. *Daphne*
- Stigma linear; style long; disk annular or lobulate ..... 2. *Edgeworthia*

Fls. in terminal spikes: bracts wanting: lvs. opposite ..... 3. *Wikstroemia*

1. **Daphne** Linn. Mezereum 瑞香属 (Shui Hsiang Shu)

Slender shrubs: *lvs. alternate*: fls. perfect, in dense terminal or axillary *bracteate* clusters; hypanthium campanulate to cylindric, usually pubescent outside; stamens 8–10, in two rows, included; *stigma capitate*, sessile or nearly so: fr. a leathery or fleshy drupe. 50 species, in Eurasia; 23 in China. (Greek: Daphnē, name of *Laurus nobilis*.)

Key to the Species

Lvs. deciduous: fls. before the lvs., in axillary clusters, scentless	1.	*D. genkwa*
Lvs. evergreen: fls. in terminal head-like clusters, fragrant	2.	*D. odora*

1. **Daphne genkwa** Sieb. & Zucc. (*Wikstroemia genkwa* (S. & Z.) Domke) 芫花 (Yüan Hua) (R.M. 658). Shrub, to 1 m.; fls. lilac, scentless, III–V. China; locally in An., Hun., Hup., Ki., Ku. Brush-, grassland. Fig. 251.
2. **Daphne odora** Thunb. 瑞香 (Shui Hsiang; Lucky-fragrance) (R.M. 661). Shrub, to 1.5 m.; fls. white to purple, fragrant, II–V. China, Japan; locally in Hun., Ku. Planted, ornamental.

2. **Edgeworthia** Meisn. 結香属 (Chieh Hsiang Shu)

Stout shrubs, sparingly branched: *lvs. alternate*, crowded at the ends of the brs.: fls. in dense axillary peduncled clusters with or before the lvs.; calyx 4–lobed; stamens 8; *style long, with linear cylindric stigma*: fr. a leathery drupe. 2 species, in eastern Asia; one in China. (After M. P. Edgeworth, 1812–1881, English botanist in the East Indies, and his sister Maria; collaborated with J. D. Hooker in preparation of sections on *Caryophyllaceae*, *Geraniaceae* and *Zygophyllaceae* for the Flora of British India.)

1. **Edgeworthia chrysantha** Lindl. (*E. papyrifera* Sieb. & Zucc.) Paper Bush 結香 (Chieh Hsiang; Fragrant knot) (B.C. 1099). Shrub, to 1 m.; fls. yellow, without involucrate bracts, III. Japan, China; locally in Che., Hup., Ki., Ku. Woodland, planted, ornamental. Fig. 252.

3. **Wikstroemia** Endl. 雁皮属 (Yen P'i Shu; Wild-goose-skin Genus)

Shrubs or small trees with *opposite lvs.*: fls. perfect, in terminal *ebracteate* clusters; hypanthium cylindric, usually pubescent outside; stamens 2×the calyx lobes; ovary pubescent, often with 1–4 disk scales at the base: fr. a drupe. 35 species, in eastern Asia, Malaysia and Australia; 22 in China. (After Johan Emanuel Wikstroem, 1789–1856, Swedish botanist.)

Key to the Species

Brts. green or purplish-black, angled and glabrous: lvs. alternate, blades and petioles glabrous, except when young: perianth glabrous, white	1.	*W. glabra*
Brts. luteo-sericeous, cylindric: lvs. opposite or sub-opposite; blades light green and pilose above, luteo-sericeous beneath: perianth luteo-sericeous without, glabrous within	2.	*W. kulingensis*

1. **Wikstroemia glabra** Cheng (Sc.C. 6:69). Shrub, to 1.5 m.; fls. white, IV. East-central China; locally in Che. Thickets.
2. **Wikstroemia kulingensis** Domke (*W. sericea* Domke) 蕘花 (Jao Hua; Grass-flower)

(Ber. N. 11:356). Shrub, to 5 dm.; fls. yellow, VII. East-Central China; locally in Ki. Brushland. Fig. 253.

Chun (Suny. 4:182) has reduced *W. sericea* (*W. kulingensis*) to *W. pilosa* Cheng, but *W. pilosa* is described as having leaf blades sparsely pilose on both surfaces, and is figured with a rather lax inflorescence (CBLS 8:141, fig. 6), while *W. kulingensis* has leaf blades luteo-sericeous beneath and a congested head-like inflorescence.

120. **ELAEAGNACEAE** Oleaster Family 胡頹子科 (Hu T'ui Tzŭ K'o)

Shrubs or small *trees covered with silvery or brown* peltate *scales*: lvs. entire, exstipulate: *fls.* axillary, perfect or unisexual, regular, *apetalous*; hypanthium with a prominent disk at the base, persistent and enclosing the fr.; calyx lobes usually 4; stamens as many as or 2×the calyx lobes; ovary apparently inferior: fr. drupe-like, surrounded by the fleshy hypanthium. 3 genera with 45 species, in North America and Eurasia; 2 genera and about 30 species in China.

1. **Elaeagnus** Linn. Oleaster 胡頹子屬 (Hu T'ui Tzŭ Shu)

Often spiny, with *alternate lvs.*: fls. perfect or polygamous; calyx lobes and *stamens 4*: stone of the drupe-like fr. striate or grooved. 40 species; 28 in China. (Greek: *elaia*, olive, and *agnos*, the Greek name of the Chaste Tree, Vitex Agnus-castus.)

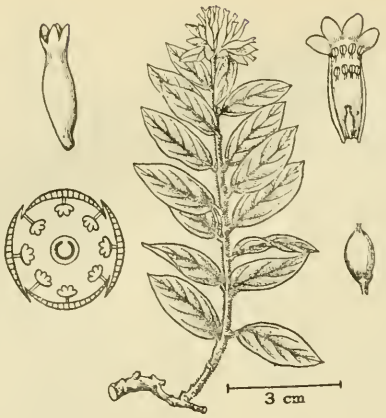
Key to the Species

a. Evergreen or half-evergreen: fls. in the autumn.
  Brs. usually unarmed: lf. margins flat ..... 1. *E. glabra*
  Brs. spiny: lvs. crisped ..... 2. *E. pungens*
aa. Deciduous: fls. in the spring.
  Fls. 1 or 2 in a lf. axil; pedicels 1-3 cm. long: brs. unarmed; brts. red-brown ..... 3. *E. multiflora*
  Fls. often 3 or more in a lf. axil; pedicels mostly less than 1 cm. long: brs. often armed; brts. often silvery ..... 4. *E. umbellata*

1. **Elaeagnus glabra** Thunb. (R.M. 665). Climbing shrub; fls. brown, XI–XII; fr. yellow-brown, IV. Japan, Korea, China; locally in Che., Hu. Forest margins.
2. **Elaeagnus pungens** Thunb. 胡頹子 (Hu T'ui Tzŭ) (R.M. 665). Shrub, to 4 m.; fls. silvery, X–XI; fr. red, V. Japan, China; locally in An., Che., Hup., Ki., Ku. Woodland.
3. **Elaeagnus multiflora** Thunb. 木半夏 (Mu Pan Hsia; Woody Pinella) (R.M. 665). Shrub, to 3 m.; fls. silvery, IV–V; fr. red, VI. China, Japan; locally in An., Che., Ki., Ku. Woodland. Fig. 254.
4. **Elaeagnus umbellata** Thunb. 牛奶子 (Niu Nai Tzŭ; Milk Flower) (R.M. 664). Shrub, to 4 m.; fls. silvery, V–VI; fr. red, IX–X. Japan, China; locally in An., Che., Ku. Woodland or brushland.

121. **LYTHRACEAE** Loosestrife Family 千屈菜科 (Ch'ien Ch'ü Ts'ai K'o)

Herbs, shrubs or trees with *opposite* or whorled *entire lvs.*: brs. often 4-angled: *fls.* perfect, *regular*, perigynous; hypanthium free, often ribbed; calyx lobes 4 or 8 (occasionally 3–16); petals as many or wanting; *stamens distinct* to the base, usually twice as many, inserted on the hypanthium below the petals; ovary free in the bottom of the hypanthium, 2-6-(occasionally 1-) celled, with *one style*, and with axile placenta:



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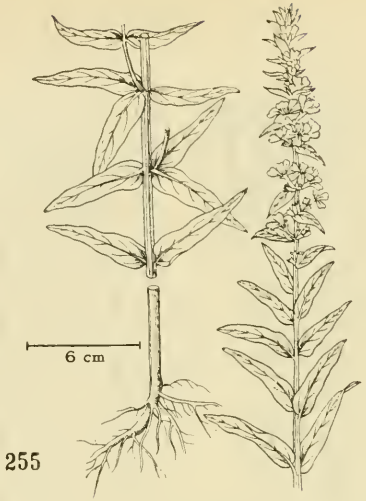

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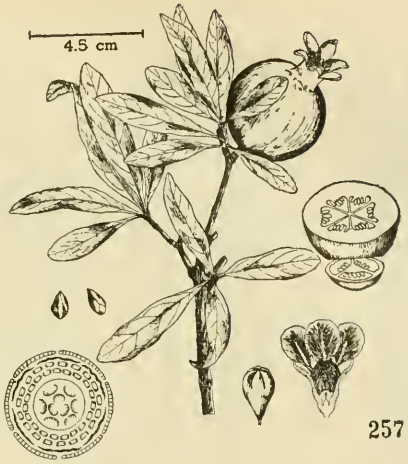

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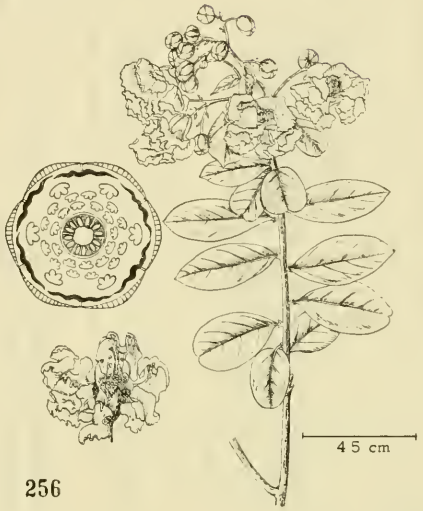

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253. Wikstroemia kulingensis
254. Elaeagnus multiflora

255. Lythrum salicaria
256. Lagerstroemia indica

257. Punica granatum
258. Camptotheca acuminata

fr. a many-seeded capsule. 23 genera with 475 species, mostly tropical, but a few in temperate regions; 6 genera and 17 species in China.

Key to the Genera

Plants herbaceous: brs. quadrangular.		
Fls. minute; hypanthium membranous; calyx lobes not appendaged...	1.	*Ammannia*
Fls. large; hypanthium coriaceous; calyx lobes with many appendages	2.	*Lythrum*
Trees or shrubs: fls. 6-merous; petals clawed; limbs often fringed: seeds winged	3.	*Lagerstroemia*

1. **Ammannia** Linn. 水苋菜属 (Shui Hsien Ts'ai Shu)

Slender erect branched glabrous *annuals* with *4-angled stems* and narrow decussate lvs., growing in wet places: *fls. small*, in dense axillary clusters, 4-parted; *hypanthium membranous*, becoming globose after flg.; *calyx* not striate, *without appendages*; petals sometimes wanting; stamens 2–8: capsule membranous, dehiscing irregularly. 20 species, chiefly in the tropics of Africa and Asia; 6 in China. (For Paul Ammann, 1634–1691, a German botanist before Linnaeus.)

Key to the Species

Lvs. broad and auricled at base, 3–8 cm. long: style longer than the ovary: capsule 2.5–3 mm. in diam	1.	*A. auriculata*
Lvs. tapering to a narrow base: style shorter than the ovary.		
Capsule about 2 mm. in diam.: lvs. 1–7 cm. long	2.	*A. baccifera*
Capsule about 1.5 mm. in diam.: lvs. 0.5–2.5 cm. long	3.	*A. multiflora*

1. **Ammannia auriculata** Willd. 耳水苋 (Êrh Shui Hsien; Ear-like Water Amaranth (G.M. 1046). Erect robust herb, to 6 dm.; fls. purple, IX; fr. X. America, Asia,) Africa; locally in Hup., Ku. Wet fields.
2. **Ammannia baccifera** Linn. (M.F. 343). Erect slender herb, to 8 dm.; fls. IX; fr. X. Old World tropics; locally in Hup., Ki. Wet fields.
3. **Ammannia multiflora** Roxb. (H.F. 2:570). Brg. herb, to 3 dm.; fls. IX; fr. X. Persia to Australia; locally in Ku. Wet fields.

2. **Lythrum** Linn. Loosestrife 千屈菜属 (Ch'ien Ch'ü Ts'ai Shu)

Herbs with *4-angled stems* and *large* di- or trimorphous *fls.*; *hypanthium coriaceous*, cylindrical, 8–12-ribbed; *calyx* 4–6-lobed, *with appendages in the sinuses*; petals 4–6, or 0; stamens 4–12; ovary 2-celled: the dehiscent capsule enclosed by the hypanthium. 24 species, widely distributed; 2 in China. (Greek: *lythron*, blood, referring to the color of the flowers or perhaps to the styptic quality of some of the species.)

1. **Lythrum salicaria** Linn. Spiked Loosestrife 千屈菜 (Ch'ien Ch'ü Ts'ai; All-bending Herb) (G.M. 1048). Erect herb, to 1 m.; fls. purple-red, VII–X. Eurasia; locally in An., Che., Hup., Ku. Wet meadows. Fig. 255.

3. **Lagerstroemia** Linn. 紫薇属 (Tzŭ Wei Shu)

Trees or shrubs with opposite (or the upper alternate) lvs.: *fls. large and showy*, regular, in axillary or terminal panicles, perfect, on bracted pedicels; hypanthium funnel-shaped or hemispherical, often ridged or winged; calyx lobes 6–9; *petals* usually *6*, with long slender claw and *crisped or fringed blade*; stamens numerous, with long

filaments; ovary winged. 30 species, southeastern Asia to Australia; 6 in China. (After Magnus von Lagerstroem, 1696–1759, friend of Linnaeus.)

Key to the Species

Calyx terete, not ribbed or appendaged, glabrous: capsule about 10 mm. long ..... 1. *L. indica*
Calyx ribbed, some forms pubescent and with appendages.
Calyx faintly 12-ribbed, glabrous or pubescent, without appendages: capsule 6–7 mm. long ..... 2. *L. subcostata*
Calyx distinctly 12-ribbed, pubescent outside, especially on the ribs, with thickened reniform appendages about 3 mm. wide attached below the sinuses and alternate with the calyx lobes: capsule about 10 mm. long ..... 3. *L. limii*

1. **Lagerstroemia indica** Linn. Crape Myrtle 紫薇 (Tzŭ Wei; Purple Vicia) (R.M. 667). Shrub or tree, to 7 m.; fls. white, pink or red, VII–IX; fr. VIII–X. Eastern Asia to Australia; locally in An., Che., Hun., Ki., Ku. Brushland, planted, ornamental. Fig. 256.
2. **Lagerstroemia subcostata** Koehne (E.P.IV. 216:260). Shrub or tree, to 6 m.; fls. white and rose, VII; fr. VIII–IX. China, Formosa, Liu Chiu Islands; locally in An., Che., Hup., Ki. Open woodland.
3. **Lagerstroemia limii** Merr. (I.P.S. 4:t.196). Shrub or tree, to 4 m.; fls. pink to purple, VI–VII; fr. VIII–IX. Southeastern China; locally in Che. Planted, ornamental.

122. PUNICACEAE Pomegranate Family 石榴科 (Shih Liu K'o)

Shrubs or small *trees*: brs. often thorny, 4-angled when young, with opposite or fascicled exstipulate entire lvs.: fls. large, perfect, regular, perigynous, 1–5 on the tips of the shoots; *hypanthium* funnel-shaped, *joined to the ovary* below; calyx lobes 5–7, persistent; petals 5–7, wirnkled; stamens many; ovary partly inferior, with several carpels in 2 series: *fr. a large leathery berry*, the many *seeds* each *surrounded by a fleshy pulp* formed of the outer seed coat. Only the following genus.

1. Punica Linn. 石榴属 (Shih Liu Shu)

Characters of the family. 2 species, from the Mediterranean region to the Himalayas; one cultivated in China. (From *Malum punicum* "apple of Carthage," an early name for the pomegranate.)

1. **Punica granatum** Linn. Pomegranate 石榴 (Shih Liu) (R.M. 667). Tree, to 10 m.; fls. red, V–VI; fr. yellow, IX–X. Southeastern Europe to Himalayas; locally in An., Hup., Ki., Ku. Cultivated, fruit. Fig. 257.

123. NYSSACEAE Tupelo Family 珙桐科 (Kung T'ung K'o; Precious-stone Family)

Deciduous *dioecious or polygamous trees* with alternate simple penninerved lvs. and fls. in heads or clusters: calyx lobes and *petals 5 or 0*; stamens usually 5 or 10; ovary 1- or 6–10-celled: *fr. samara- or drupe-like, crowned with remnants of the calyx*: seeds one in each cell. Sometimes included in Cornaceae. 3 genera with 8 species, in North America, Asia, Malaya; all three genera, each with one species occurring in China.

KEY TO THE GENERA

Fls. sessile, capitate: fr. samara-like, in a head ..... 1. *Camptotheca*
Fls. pedicelled, in axillary clusters: fr. a drupe ..... 2. *Nyssa*

1. **Camptotheca** Decne. 喜樹属 (Hsi Shu Shu)

Polygamous: *infl. head-like*: calyx teeth and petals 5; stamens 10; disk cup-shaped; ovary 1-celled: *fr.* 1-seeded, *samara-like*, clustered *in globular heads*. One species, found only in China. (Greek: *campto*, I bend, and *theca*, a case, referring to the anthers which are bent inward in a distinctive manner.)

1. **Camptotheca acuminata** Decne. 喜樹 (Hsi Shu; Tree-of-Joy) (Lee 857). Tree, to 20 m.; fls. VIII–IX; fr. winged, X. China; locally in An., Hun., Hup., Ki., Ku. Woodland, planted, ornamental, Fig. 258.

2. **Nyssa** Linn. SOUR GUM 紫樹属 (Tzŭ Shu Shu)

Polygamo-dioecious: *fls. clustered on axillary peduncles*; calyx lobes and petals 5; stamens 5–12: disk conspicuous; ovary 1–2-celled: *fr. an* oblong *drupe*, usually 1-seeded, with a ribbed or winged stone. 6 species, 4 in North America and 2 in eastern Asia; one in China. (The Greek name for "a nymph"; referring to the habitat in swampy or moist places.)

1. **Nyssa sinensis** Oliv. CHINESE TUPELO 紫樹 (Tzŭ Shu; Purple Tree) (R.M. 668). Tree, to 15 m.; fls. V–VI; fr. a drupe, X. Central China; locally in An., Che., Hun., Hup., Ki., Ku. Forest. Fig. 259.

124. **ALANGIACEAE** ALANGIUM FAMILY 八角楓科 (Pa Chio Fêng K'o)

Trees or shrubs with *alternate* simple *usually lobed* estipulate *lvs.*: *fls. perfect*, regular, in axillary cymes; calyx lobes and petals 4–10, the latter linear or strap-shaped; stamens as many as or 2×the petals; disk large; ovary inferior: *fr.* 1-seeded, *drupe-like*, crowned by the calyx. Only the following genus.

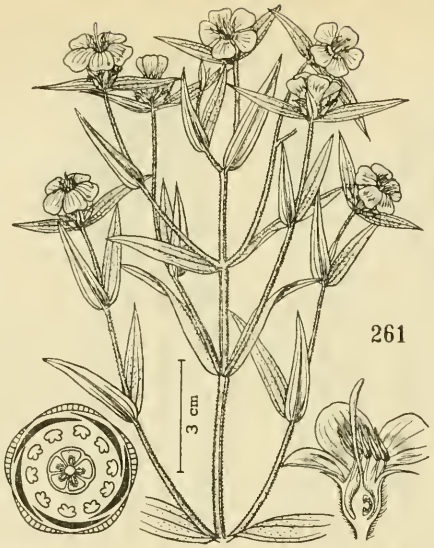
1. **Alangium** Lam. 八角楓属 (Pa Chio Fêng Shu)

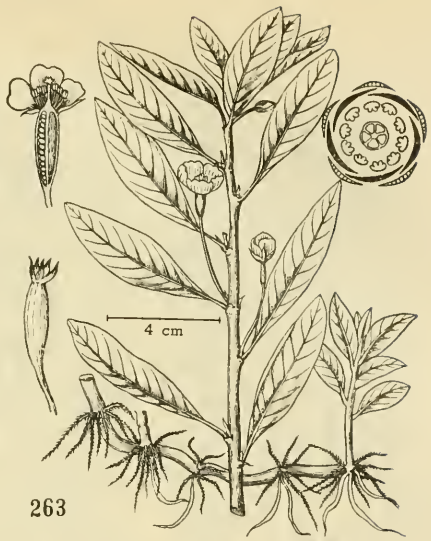
Characters of the family. 22 species, mostly of southern Asia, but extending to Australia and Africa; 4 in China. (Name an anagram of Adanson's name "Angolam" for this plant.)

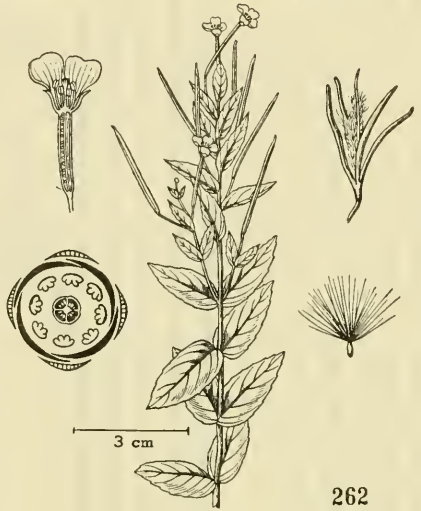
KEY TO THE SPECIES

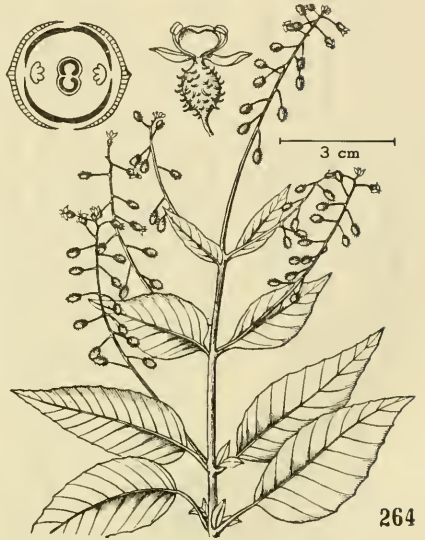
Corolla 10–30 mm. long; filaments free; anthers 2–4× the filaments.
Corolla 10–15 mm. long; stigmas 2–4-lobed: lvs. often irregularly lobed ..... 1. *A. chinense*
Corolla 20–30 mm. long; stigmas 4-parted: lvs. not lobed ..... 2. *A. handelii*
Corolla 30–40 mm. long; filaments joined to base of petals; anthers as long as filaments: lvs. 3–5-sinuate-lobed ..... 3. *A. platanifolium*

1. **Alangium chinense** (Lour.) Harms 華瓜木 (Hua Kua Ma; Chinese Gourd-tree) (R.M. 669). Shrub or tree, to 8 m.; fls. white or cream-colored, VI–VIII; fr. VIII–IX. Central China, Japan, southeastern Asia; locally in An., Che., Ki., Ku. Woodland. Fig. 260.
2. **Alangium handelii** Schnarf (Ber.N. 10:827). Shrub or tree, to 20 m.; fls. white









259. Nyssa sinensis
260. Alangium chinense

261. Osbeckia chinensis
262. Epilobium roseum

263. Jussiaea repens
264. Circaea lutetiana

or cream-colored, VI. Eastern and central China, Korea, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.

3. **Alangium platanifolium** (Sieb. & Zucc.) Harms 八角枫 (Pa Chio Fêng; Eight-angled Maple) (R.M. 669). Tree or shrub, to 5 m.; fls. white or cream-colored, VI–VII. Central China, Japan; locally in Ki., Ku. Woodland.

125. **MYRTACEAE** Myrtle Family 桃金孃科 (T'ao Chin Niang K'o)

Evergreen *aromatic* woody plants: *lvs.* usually opposite, entire, pellucid-*punctate*, estipulate: fls. perfect, regular; sepals and petals 4–5 (occasionally 0); stamens numerous, sometimes in fascicles opposite the petals; ovary inferior, 1-many-celled: *fr. a* capsule, *berry* (ours), drupe or nut, 1-many-seeded. 80 genera with 3,000 species, tropical and subtropical; 5 genera and 20 species in China.

1. **Syzygium** Gaertn. 蒲桃属 (P'u T'ao Shu; Swamp-peach Genus)

Trees or shrubs with opposite coriaceous evergreen lvs.; fls. in trichotomous usually terminal corymbose panicles, 4- or rarely 5-parted; *petals more or less joined in a cap* and falling together; stamens numerous and free: fr. a berry, crowded by the remains or scar of the calyx, usually with 1 seed; *seed coat adhering loosely to the pericarp*. Over 140 species, in tropical Asia, Africa, Australia; about 10 in China. (Greek: *suzugia*, to join together, referring to the joining together of the pairs of opposite nearly sessile lvs. of a Jamaican species, as described by Patrick Browne in 1756. (Browne, 240,t.7,f.2.)

1. **Syzygium buxifolium** Hook. & Arn. (Be.F. 118). Shrub or small tree; fls. white, VII–VIII. Southeastern Asia; locally in An., Che., Hun., Hup. Ki. Woodland.

126. **MELASTOMACEAE** Melastoma Family 野牡丹科 (Yeh Mu Tan K'o; Wild-peony Family)

Herbs (ours) shrubs or trees with *opposite estipulate* entire *lvs.* which are characteristically 3–7-ribbed: *fls.* perfect, regular, *epigynous*, often showy, usually 4-parted; stamens few or many; *anthers opening by apical pores*; *connectives* often *with* peculiar and *diverse appendages*; ovary 1-several-celled; style simple: fr. berry-like or capsular. 150 genera with 4,000 species, in all tropical countries; 10 genera and 20 species in China.

Key to the Genera

Calyx tube with stellate hairs or pectinate scales; lvs. mostly linear....	1.	*Osbeckia*
Calyx tube 4-winged, glabrous: lvs. ovate.....	2.	*Sarcopyramis*

1. **Osbeckia** Linn. 金錦香属 (Chin Chin Hsiang Shu)

Setose herbs or shrubs with 3–7-ribbed mostly *linear lvs.*: fls. conspicuous, purple, mauve or white; *calyx tube with stellate hairs or pectinate scales*; stamens 10 or 8; connectives not spurred; ovary inferior, 4–5-celled: fr. a capsule, opening with 4–5 valves: *seeds* many, *curved through a half circle*, tuberculate. 32 species, in eastern Asia, Malaysia and Australia; 2 in China. (Named for Peter Osbeck, 1723–1805, Swedish naturalist who voyaged to the East Indies in 1757.)

1. **Osbeckia chinensis** Linn. 金錦香 (Chin Chin Hsiang; Precious-ornamental Fragrance) (Be.F. 114). Erect herb, to 5 dm.; fls. pink, VIII–IX. Tropical Asia, Malaysia; locally in An., Hup., Ki., Ku. Grassland, damp meadows. Fig. 261.

2. **Sarcopyramis** Wall. 肉穗草属 (Jou Hui Ts'ao Shu)

A *glabrous herb* with 3-ribbed *ovate lvs.*: fls. small, rose-purple; *calyx tube glabrous, 4-winged*; stamens 8; anthers oblong, with spurred connectives; ovary half-inferior, 4-celled: fr. a capsule, opening with 4 valves; *seeds* numerous, *oblong* and tuberculate. One species, in eastern Asia. (Greek: *sarko*, flesh, and *pyramis*, a pyramid, referring to the calyx which has the form of a fleshy inverted pyramid.)

1. **Sarcopyramis nepalensis** Wall. 肉穗草 (Jou Hui Ts'ao; Fleshy-head Herb) (H.F. 2:541). Herb, to 5 cm.; fls. pink, VIII. Southeastern Asia; locally in Ki. Moist banks.

127. **ONAGRACEAE** Evening Primrose Family 柳葉菜科 (Liu Yeh Ts'ai K'o)

Terrestrial herbs, rarely shrubs or trees: *lvs. not ribbed*: fls. perfect, regular, often conspicuous, usually solitary or few; calyx lobes and petals usually 4; stamens 2× the petals, or fewer; *ovary inferior*, 2-4-celled; *style 1*: fr. a capsule or berry with many small seeds. 20 genera with 650 species, widely distributed, but especially abundant in America; 5 genera and 35 species in China.

Key to the Genera

A. Herbs.
  B. Petals and stamens 4 or more: fr. a capsule.
    C. Seeds with a tuft of silky hairs at one end ..... 1. *Epilobium*
    CC. Seeds without a tuft of hairs.
      Calyx tube scarcely or not at all prolonged beyond the ovary; lobes persistent.
        Stamens 2× the calyx lobes: lf. blades with rounded or emarginate apex ..... 2. *Jussiaea*
        Stamens 1× the calyx lobes: lf. blades acute at apex .... 3. *Ludwigia*
      Calyx tube prolonged beyond the ovary; lobes deciduous ... 4. *Oenothera*
  BB. Petals and stamens 2: fr. a small bristly bur ..... 5. *Circaea*
AA. Shrubs: calyx tube prolonged beyond the ovary, colored and showy .. 6. *Fuchsia*

1. **Epilobium** Linn. Willow Herb 柳葉菜属 (Liu Yeh Ts'ai Shu)

Herbs (ours), sometimes suffrutescent, with willow-like lvs.: fls. purple, rose-colored to white, rarely yellow; *petals 4*; *stamens 8*, unequal; ovary 4-celled; stigma 4-lobed: *capsule* slender; *seeds* many, each *with a tuft of* silky *hairs*. 200 species, temperate parts of the world; 20 in China. (Greek: *epi*, upon, and *lobus*, pod referring to the structure of the flower.

1. **Epilobium roseum** Schreb. (H.F. 2:584). Erect herb, to 1 m.; fls. pink, VII-VIII; fr. VIII-IX. Eurasia; locally in An., Hun., Hup., Ki. Woodland, forest. Fig. 262.

2. **Jussiaea** Linn. Primrose Willow 水龍属 (Shui Lung Shu)

Erect woody or prostrate *herbaceous* (ours) plants with alternate entire lvs.: fls. solitary and axillary, yellow or white; *tube of the calyx not prolonged beyond the ovary*; *lobes* linear *persistent*; stamens 2× the petals; ovary 4-5-celled: *capsule* 8-10-ribbed; *seeds not hairy-tufted*. 50 species, in temperate and warm countries, most abundant in South America; 6 in China. (In honor of Bernard de Jussieu, 1699-1777, noted French botanist, founder of the natural system of plant classification.)

1. **Jussiaea repens** Linn. 水龍 (Shui Lung; Water-Dragon) (Mak.F. 293). Decumbent herb; fls. yellow, VI. Warm countries; locally in An., Che., Ku. Ditch banks. Fig. 263.

3. **Ludwigia** Linn. 喇叭草属 (La Pa Ts'ao Shu; Trumpet Herb Genus)

Herbs with alternate simple entire lvs. and sessile, solitary axillary yellow fls.: *calyx-tube* scarcely or *not* at all *prolonged beyond the ovary*; calyx-teeth 3–5, acute; *stamens as many as the calyx-lobes*: capsule linear to oblong (ours), with many smooth seeds. About 30 species, in warm regions of both hemispheres; 3 or 4 in China. (Named for Christian G. Ludwig, 1709–1773, German botanist.)

1. **Ludwigia jussiaeoides** Desr. (*L. prostrata* Roxb.) (M.F. 355; Tor.B. 71:152). Bushy herb, to 8 dm.; fls. yellow, stamens usually 4, VII–VIII; fr. IX–X. Southeastern Asia to Australia; locally in Hun., Hup., Ki., Ku. Grassland, thickets.

4. **Oenothera** Linn. Evening Primrose 月見草属 (Yüeh Chien Ts'ao Shu)

Herbs (ours), sometimes woody at the base, with alternate rarely basal lvs.: fls. showy, yellow, white or rose-colored, axillary and usually solitary; *calyx tube produced beyond the ovary*; *the lobes deciduous*; petals 4; stamens 8; ovary 4-celled: *capsule* 4-valved. 90–100 species, widely distributed in North America; one in China. (From the Greek terms meaning "wine-scenting," referring to an old use of the roots.)

1. **Oenothera lamarckiana** Ser. 月見草 (Yüeh Chien Ts'ao; Seen-under-the-moonlight Herb) (B.M. 550). Erect herb, to 1 m.; fls. yellow, VII. Garden origin; locally in Ki., Ku. Planted, ornamental and naturalized.

5. **Circaea** Linn. Enchanter's Nightshade 谷蓼属 (Ku Liao Shu)

Low perennial *herbs* with *opposite lvs.* on slender petioles and small white fls. in racemes; calyx lobes, *petals and stamens 2*; *fr. a* small indehiscent *bur*, *bristly with hooked hairs*, 1–2-celled; cells 1-seeded. 7 species, in north temperate and cold regions; 5 in China. (Latin: *Circe*, the enchantress of a Greek legend.)

Key to the Species

Lvs. not cordate: axes of the infl. more or less pubescent	1.	*C. lutetiana*
Lvs. more or less cordate: axes of the infl. densely hairy	2.	*C. cordata*

1. **Circaea lutetiana** Linn. 谷蓼 (Ku Liao; Valley Polygonum) (H.F. 2:589). Erect herb, to 8 dm.; fls. white, VII–VIII; fr. VIII–IX. Northern hemisphere; locally in An., Hun., Ki., Ku. Forest shade. Fig. 264.
2. **Circaea cordata** Royle 柔毛谷蓼 (Jou Mao Ku Liao; Soft-hairy Circaea) (H.F. 2: 589). Erect herb, to 1 m.; fls. white, VII–VIII; fr. VIII–IX. Eastern Asia; locally in An., Ki. Forest shade.

6. **Fuchsia** Linn. 吊金鐘属 (Tiao Chin Chung Shu; Pendulous Golden-bell Genus)

Shrubs or small trees with showy axillary pendulous fls.: calyx tube prolonged beyond the ovary, with 4 spreading lobes; petals usually 4 (sometimes 5 or 0); stamens 8, often exserted; style exserted: *fr. a* 4-celled fleshy *berry*. 70 species,

mostly of tropical and subtropical America; 3 or more cultivated in China as ornamentals. (After Leonard Fuchs, 1501–1565, German physician and botanist.)

Key to the Species

Petioles 10-25 mm. long: hypanthium 10-25 mm. long; sepals 25-30 × 8-11 mm ..... 1. *F. hybrida*
Petioles 3-10 mm. long: hypanthium 8-10 mm. long; sepals 15-25 × 3-4 mm. ..... 2. *F. magellanica*

1. **Fuchsia hybrida** Hort. ex Vilm. (B.M. 740). Shrubby; fls. red, purple, rose or white; lvs. 4–10 cm. long. Cultigen; locally in Ku. Cultivated, ornamental.
2. **Fuchsia magellanica** Lam. (B.M. 740). Shrubby; fls. red or purple; lvs. 2–3 cm. long. Introduced from Chile; locally in Ku. Planted, ornamental.

128. **HYDROCARYACEAE** Water Nut Family 菱科 (Ling K'o)

Floating aquatic herbs with *lvs. of two kinds*; *the submersed* ones opposite, *pinnatisect*; the floating ones rhombic, in a rosette, coarsely toothed, with spongy inflated petioles: fls. 4-merous, solitary, on axillary peduncles among the floating lvs.: *fr. a* large 1-seeded *nut* with 2–4 angles or spines. Only the following genus.

1. **Trapa** Linn. Water Caltrop 菱属 (Ling Shu)

Characters of the family. 11 species, in warm countries of the eastern hemisphere; one in China. (Latin: *calcitrapa*, caltrop, a 4-pronged instrument of war; referring to the spiny fruit.)

1. **Trapa natans** Linn. Water Chestnut 菱 (Ling) (B.M. 734). Floating herb; fls. white; fr. a large nut with 2–4 angles or spines, IX–X. Eurasia; locally in An., Hup., Ki., Ku. Ponds, lakes. Fig. 265.

129. **HALORAGACEAE** Water Milfoil Family 小二仙科 (Hsiao Êrh Hsien K'o)

Aquatic or marsh herbs with variously modified lvs. and inconspicuous regular fls.: calyx lobes and petals 2–4 or 0; stamens 1–8; *ovary inferior*, 1–4-celled: fr. a nutlet or drupe, angled or winged. 8 genera with 100 species widely distributed; 4 genera and 6 species in China.

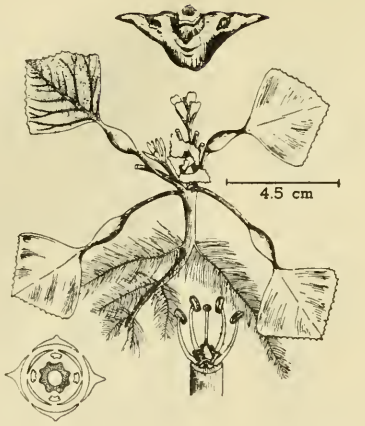
Key to the Genera

Terrestrial: lvs. opposite, ovate ..... 1. *Haloragis*
Aquatic: lvs. whorled, the immersed ones pinnately dissected..... 2. *Myriophyllum*

1. **Haloragis** Forst. 小二仙属 (Hsiao Êrh Hsien Shu)

Terrestrial brg. wiry *herbs* with usually *opposite toothed lvs.* and minute often unisexual sessile 4-merous fls.: petals sometimes 0; stamens 8; ovary 2–4-celled; stigmas 4: fr. a 2–4-celled, 2–4-seeded nut (rarely 1-celled and 1-seeded.) 40 species, eastern Asia to New Zealand; 2 in China. (Greek: *halo*, the sea; and *rhagos*, berry.)

1. **Haloragis micrantha** (Thunb.) R. Br. 小二仙草 (Hsiao Êrh Hsien Ts'ao; Little-fairy Herb) (Mak.F. 289). Erect herb, to 1 dm.; fls. reddish, VII. Australasia; locally in An., Hun., Hup., Ki. Wet rocks.



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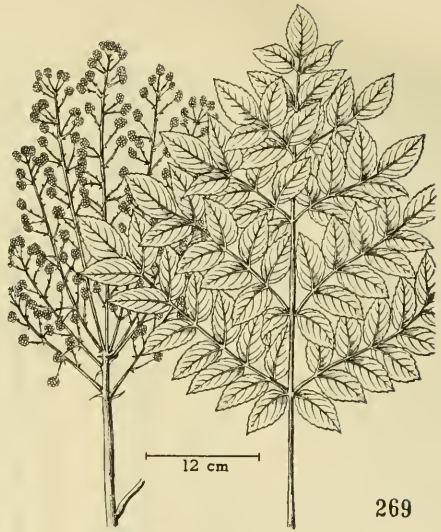

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265. Trapa natans
266. Kalopanax pictus

267. Dendropanax chevalieri
268. Hedera helix

269. Aralia chinensis
270. Acanthopanax sieboldianus

2. **Myriophyllum** Linn. Water Milfoil 狐尾藻属 (Hu Wei Tsao Shu; Fox-tail Alga Genus)

Monoecious, dioecious or polygamous perennial freshwater *aquatics* with alternate or whorled *lvs. pinnatifid into hair-like segments*: the upper fls. staminate, the lower pistillate, the intermediate often bisexual; calyx lobes and petals 4 or 0; stamens 4–8; ovary 4-celled; styles 4: fr. splitting into 4 indehiscent often tuberculate carpels. 20 species, widely distributed; 2 in China. (Greek: *myrios*, numberless, and *phyllon*, leaf, referring to the innumerable divisions of the leaves.)

Key to the Species

Bracts of the infl. undivided, mostly shorter than the fls.	1.	*M. spicatum*
Bracts of the infl. pinnately dissected, mostly longer than the fls.	2.	*M. verticillatum*

1. **Myriophyllum spicatum** Linn. 薤草 (Tsa Ts'ao; Tufted Herb) (Hegi 5(2):901). Submersed herb; fls. yellow, VI; fr. IX. Eurasia, North America; locally in An., Che., Ku. Ponds, lakes.
2. **Myriophyllum verticillatum** Linn. (G.M. 1074). Submersed herb; fls. VI; fr. IX. Eurasia, North America; locally in An., Ku. Ponds and lakes.

130. **ARALIACEAE** Ginseng Family 五加科 (Wu Chia K'o)

Herbs, shrubs or trees, sometimes climbing, often with prickly stems: lvs. alternate: *fls. in umbels*, small, regular, sometimes unisexual, usually 5-merous (6–8-merous in Dendropanax); disk present; ovary inferior, 2–15-celled; *styles as many as the cells*: *fr. a berry or drupe.* 60 genera with 800 species, in temperate and tropical regions; 17 genera and about 120 species in China.

Key to the Genera

A. Lvs. simple, lobed or entire.		
Trees or shrubs, not vines.		
Spiny shrubs or trees with palmately lobed serrulate lvs	1.	*Kalopanax*
Unarmed glabrous trees or shrubs: lvs. simple, entire or 3-5-lobed	2.	*Dendropanax*
Evergreen shrubby vines, climbing by adventitious roots	3.	*Hedera*
AA. Lvs. compound.		
Lvs. pinnately compound	4.	*Aralia*
Lvs. digitately compound.		
Infl. of a few axillary or terminal umbels: mostly woody plants.	5.	*Acanthopanax*
Infl. of a single terminal umbel: perennial herbs	6.	*Panax*

1. **Kalopanax** Miq. 刺楸属 (Tzŭ Ch'iu Shu)

Shrub or tree with stout *brs. armed* with short broad-based spines or prickles: *lvs. simple, palmately-lobed*, serrulate: fls. perfect, racemosely arranged in compound terminal panicles; calyx 5-dentate; petals 5, valvate; ovary 2-celled; styles connate: fr. subglobose, 2-seeded. One species, in eastern Asia. (Greek: *kalo*, beautiful; and *Panax*.)

1. **Kalopanax pictus** (Thunb.) Nakai (*Acanthopanax ricinifolius* (S. & Z.) Seem.) 刺楸 (Tzŭ Ch'iu) (R.M. 675). Shrub or tree, to 30 m.; fls. white, VIII–IX; fr. blue-black, X–XI. Japan, China; locally in An., Che., Hun., Hup., Ki., Ku. Forest. Fig. 266.

2. **Dendropanax** Decne. & Planch. 杞李葧属 (Ch'i Li Shên Shu; Medlar-plum Ginseng Genus)

Unarmed evergreen glabrous *trees or shrubs* with *simple entire or* irregularly *3–5-lobed* lvs.: petals 6–8, valvate; ovary 5-celled: fr. globose or ellipsoid. 80 species, tropical America and eastern Asia; 15 in China. (Greek: *dendro*, tree; and *Panax*.)

1. **Dendropanax chevalieri** (Vig.) Merr. (*Gilibertia sinensis* Nakai) (Sarg. 2:39). Shrub or tree, to 7 m.; fls. yellowish, VIII–IX; fr. X–XI. South China, Indo-China; locally in An., Che., Ki. Forest. Fig. 267.

3. **Hedera** Linn. Ivy 常春藤属 (Ch'ang Ch'un T'êng Shu)

Evergreen shrubs with *simple* often lobed *lvs.*, *climbing by aerial rootlets*: fls. perfect; ovary 5-celled; styles united: fr. a 3–5-seeded berry. 5 species, in Europe, North Africa, Asia; 2 in China. (Ancient Latin name of the Ivy.)

Key to the Species

Hairs of young growth stellate: umbels with 5 or 6 rays: fr black	1.	*H. helix*
Hairs of young growth scaly: umbels with 15–20 rays: fr. red or yellow.	2.	*H. nepalensis* var. *sinensis*

1. **Hedera helix** Linn. English Ivy (R.M. 672). Climbing woody vine; fls. IX–X; fr. black, IX–V. Europe; locally in An., Ku. Planted, ornamental. Fig. 268.
2. **Hedera nepalensis** K. Koch. var. **sinensis** (Tobler) Rehd. Chinese Ivy 常春藤 (Ch'ang Ch'un T'êng; Evergreen Vine) (R.M. 674). Climbing woody vine; fls. X; fr. yellow or red, IV. China; locally in An., Che., Hun., Hup., Ki., Ku. Forest.

4. **Aralia** Linn. 楤木属 (Ts'ung Mu Shu)

Aromatic polygamous, often prickly herbs, shrubs or trees, with *pinnately compound* deciduous estipulate *lvs.*: *flg. umbels in large terminal panicles*; ovary usually 5-celled: styles 5: fr. a berry-like drupe with 2–5 stones. 30 species, in North America, Asia, Malaya and Australia; 20 in China. (Name of uncertain origin.)

Key to the Species

Herbaceous plants; unarmed	1.	*A. cordata*
Shrubs or small trees; stems prickly or spiny.		
Stems prickly, not densely spiny: pedicels of the infl. 4–6 mm. long.	2.	*A. chinensis*
Stems densely spiny: pedicels of the infl. 5–15 mm. long	3.	*A. echinocaulis*

1. **Aralia cordata** Thunb. (Sarg. 2:104). Herb, 1–3 m. high; fls. VII. Japan and China; locally in An. In stream beds.
2. **Aralia chinensis** Linn. Chinese Angelica Tree 楤木 (Ts'ung Mu) (R.M. 679). Shrub or tree, to 8 m.; fls. white, VII–VIII. China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland, Forest. Fig. 269.
3. **Aralia echinocaulis** Hand.-Mazz. (Sarg. 2:111). Shrub or tree, to 7 m.; fls. white, VI–VIII. China; locally in An., Che., Hun., Ki. Brushy slopes.

5. **Acanthopanax** Miq. 五加属 (Wu Chia Shu)

Sparingly brg. usually prickly *trees or shrubs* with palmately compound estipulate lvs.: *petals valvate*; ovary cells and styles 2–5: *fr. a 2–5-seeded* black *berry*. 30

species, Asiatic; most of them occurring in China. (Greek: *acanthos*, spine; and *Panax*.)

Key to the Species

a. Lfts. 3, glabrous.
Brs. unarmed: styles 2-4 ..... 1. *A. evodiaefolius*
Brs. prickly: styles 2 ..... 2. *A. trifoliatus*
aa. Lfts. 5.
b. Lfts. with distinct petiolules.
Lfts. glabrous, or scabrous above, pubescent beneath..... 3. *A. leucorrhizus*
Lfts scabrous above and fulvous-pubescent along the veins beneath; sometimes with recurved spines on petiolules and midrib beneath..... 3a. *A. leucorrhizus* var. *scaberulus*
bb. Lfts. sessile or nearly so.
Styles 2, slender and distinct..... 4. *A. gracilistylus*
Styles 5, connate nearly to the apex.
Lfts. glabrous: peduncles slender, 5-10 cm. long, glabrous. 5. *A. sieboldianus*
Lfts. pubescent along the veins beneath: peduncles stout, 1-3 cm. long, pubescent..... 6. *A. henryi*

1. **Acanthopanax evodiaefolius** Franch. (Lee 865). Tree, to 15 m.; fls. yellowish green, VI; fr. black, X. China; locally in An., Che., Hup., Ki. Forest.
2. **Acanthopanax trifoliatus** (L.) Merr. (*A. aculeatus* H. Witte) (Sarg. 2:86). Scandent shrub or climber, to 7 m.; fls. VIII-IX; fr. black, IX-X. China, Philippine Islands; locally in Che., Hun., Hup., Ki. Forest.
3. **Acanthopanax leucorrhizus** (Oliver) Harms 藤五加 (T'êng Wu Chia; Vine-Aralia) (R.M. 677). Shrub, to 4 m.; fls. VII; fr. X. Central and western China; locally in Ki. Forest.
3a. **Acanthopanax leucorrhizus** var. **scaberulus** Harms (R.M. 677). Ki., Hup.
4. **Acanthopanax gracilistylus** W. W. Sm. (Sarg. 2:84). Scandent shrub; fls. VI-VII; fr. black, VIII-IX. China; locally in An., Che., Hun., Hup., Ki., Ku. Forest shade.
5. **Acanthopanax sieboldianus** Mak. (*A. spinosus* Miq., excl. basonym.) (R.M. 678). Shrub, to 2 m.; fls. VI; fr. black, VIII. Japan, China; locally in An., Che. Woodland. Fig. 270.
6. **Acanthopanax henryi** (Oliver) Harms (R.M. 677). Shrub, 1-3 m. high; fls. VIII-IX; fr. black, IX-X. Northern and eastern China; locally in Che., Hon., Hup. Woodland.

6. **Panax** Linn. Ginseng 人参属 (Jên Shên Shu)

Dioecious or polygamous perennial *herbs* from tuberous roots, with a simple erect stem bearing a single whorl of 3-5 palmately *5-foliolate lvs* and *a solitary simple terminal umbel* of greenish fls.: *petals imbricate*; carpels and styles 2-3: fr. a small drupe-like berry. 6 species, in North America and eastern Asia; 2 in China. (Greek: all healing or panacea.)

1. **Panax pseudo-ginseng** Wall. 人参 (Jên Shên; Human Tonic) (B.M. 745). Perennial herb; fls. VII. Eastern, western and southern China, northern India, Indo-China; locally in Che., Hup., Ki. Forest shade.

131. UMBELLIFERAE Carrot Family 繖形科 (San Hsing K'o; Umbrella-form Family)

Herbs, often aromatic or rank-scented, and with hollow stems: lvs. alternate, usually lobed, dissected, or divided, and usually sheathing at the base: *fls.* small, perfect or polygamous, usually *in* simple or compound, often involucrate *umbels*; calyx tube united with the *inferior ovary*, sometimes bearing 5 teeth; petals and stamens 5, on a disk above the ovary, surrounding the base of the *two styles* (stylopodium): *fr.* (a schizocarp) *of 2 dry indehiscent* compressed *seed-like carpels* (mericarps), generally separating from each other at maturity, and hanging from a slender prolongation of the axis (carpophore), each usually with 5 primary ribs and often 4 secondary ones; longitudinal canals containing aromatic oils commonly occur between the ribs. Some 300 genera with 2,500 species, in all parts of the world; at least 25 genera and several hundred species in China.

Key to the Genera

A. Prostrate herbs with simple stipulate lvs.: fls. in small axillary simple subcapitate umbels ..... 1. *Hydrocotyle*

AA. Erect or decumbent herbs with simple compound cleft or dissected estipulate lvs.

B. Fr. armed with hooks or prickles.

Infl. more or less dichotomously branched: fr. ribs indistinct 2. *Sanicula*

Infl. of definite compound umbels: fr. ribs distinct; both primary and secondary ribs developed.

Involucre of simple bracts or wanting: fr. compressed laterally; the secondary ribs hidden by prickles or tubercles occupying the intervals ..... 3. *Torilis*

Involucre of multi-cleft leaflike bracts: fr. compressed dorsally; the secondary ribs prickly-winged ..... 4. *Daucus*

BB. Fr. glabrous to hispid, but not armed with hooks or prickles.

C. Fr. terete or lightly compressed either laterally or dorsally, not prominently flattened dorsally.

D. Lvs. all simple and entire ..... 5. *Bupleurum*

DD. Lvs. variously toothed dissected or compound, occasionally reduced to linear phyllodes.

E. Fr. several times longer than broad.

Fr. hispid, bearing conspicuous tails at base .... 6. *Osmorhiza*

Fr. glabrous, blunt at base.

Fr. conspicuously beaked: involucel conspicuous 7. *Anthriscus*

Fr. beakless: involucel usually wanting..... 8. *Cryptotaenia*

EE. Fr. not more than thrice as long as broad.

F. Plants annual: pericarp very thin and hard .... 9. *Coriandrum*

FF. Plants perennial or biennial: pericarp not especially hard.

G. Ovaries pubescent: marginal fls. radiant .. 10. *Pimpinella*

GG. Ovaries glabrous: fls. all regular.

H. Fls. yellow.

Plants glaucous: involucel absent: foliage anise-scented ..... 11. *Foeniculum*

Plants green: involucel present: foliage parsley-scented ..... 12. *Petroselinum*

HH. Fls. white to red, but never yellow.

I. Fr. ribs corky or slightly winged.

J. Involucre and involucel wanting 13. *Apium*
JJ. Involucre and involucel present.
Fr. ribs corky: plants of marshes or stream banks.
Calyx teeth conspicuous, persistent on fr.: styles slender erect persistent 14. *Oenanthe*
Calyx teeth obsolete: styles short reflexed, not persistent ..... 15. *Sium*
Fr. ribs or some of them narrowly thin-winged: plants of usually drier situations..... 16. *Ligusticum*
II. Fr. smooth, the ribs inconspicuous.
Bractlets nearly equaling the fr.: petals obovate ..... 17. *Tongoloa*
Bractlets much shorter than the fr.: petals oblong to oval.... 18. *Changium*
CC. Fr. strongly flattened dorsally, the lateral ribs prominently winged.
K. Plants annual: fr. small (up to 3 mm. long) ..... 19. *Cnidium*
KK. Plants perennial (or biennial): fr. larger (usually 5-10 mm. long).
L. Marginal fls. radiant ..... 20. *Heracleum*
LL. Fls. all regular.
Fr. wings broad and membranous.
Fls. yellow: involucel wanting ..... 21. *Pastinaca*
Fls. white or red to purple; involucel present.. 22. *Angelica*
Fr. wings narrow and corky-thickened ..... 23. *Peucedanum*

1. **Hydrocotyle** Linn. Water Cup 石胡荽属 (Shih Hu Sui Shu)

Prostrate perennial marsh or aquatic *herbs*: *lvs. simple*, palmately lobed or peltate, with scale-like stipules: *fls.* white, *in small axillary subcapitate simple umbels*; calyx teeth none or very small; petals entire, acute: fr. laterally compressed; carpels with 5 primary ribs. About 100 species of warm-temperate regions, chiefly of the southern hemisphere but widely distributed; 7 in China. (Greek: *hydro*, water; and *cotyle*, a flat cup. The peltate leaves of some species are cup-shaped.)

1. **Hydrocotyle sibthorpoides** Lam. (*H. rotundifolia* Roxb.) Asiatic Pennywort 石胡荽 (Shih Hu Sui; Rock Caraway) (M.F. 360; M.E. 3:237). Prostrate herb; fls. VI; fr. VIII. Asia, widely introduced in tropical and subtropical regions; locally in An., Ki., Ku. Wet places. Fig. 271.

2. **Sanicula** Linn. Sanicle 变豆菜属 (Pien Tou Ts'ai Shu)

Erect perennial or biennial glabrous *herbs* with 3- (ours) 7-*cleft* or -divided *lvs.*, the divisions ovate to lanceolate: *infl. dichotomously branched*; fls. yellowish, white or purplish, in irregularly compound umbels; the umbellets capitate; petals obovate, incurved and notched at the tip: fr. globular, covered (in ours) with strongly hooked bristles; *ribs indistinct.* About 40 species in temperate regions; 10 in China. (Latin: *sanare*, to heal.)

1. **Sanicula chinensis** Bunge (*S. europaea* Linn. var. *chinensis* (Bge.) Diels) 变豆菜 (Pien Tou Ts'ai; Variable-bean Plant) (Cal. B. 25:39). Erect herb, to 1 m.; fls. VI; fr. VIII. Northeastern Asia; locally in An., Che., Hup., Ki., Ku. Roadsides and field margins. Fig. 272.

3. **Torilis** Adans. Hedge-Parsley 窃衣属 (Ch'i I Shu)

Erect hispid *annuals* with bipinnate *multicleft* lvs., the divisions lanceolate to linear, and compound umbels of white fls. in dense heads: *involucral bracts simple*, linear: petals cuneate or obovate, incurved and mostly 2-lobed; stylopodium conical: *fr.* ovoid or oblong, *laterally compressed*; primary ribs 5; secondary ribs winged and each *with* a row of *bristles or tubercles* which are not strongly curved at the tip. 20 species, northern hemisphere; 2 in China. (Latin: *torus*, cushion.)

Key to the Species

Rays 5-10: involucre present: fr. ovoid, 1.5-4 mm. long ..... 1. *T. japonica*
Rays 2 or 3: involucre usually wanting: fr. oblong, 5-7 mm. long ..... 2. *T. scabra*

1. **Torilis japonica** (Houtt.) DC. (*T. anthriscus* (L.) Gmel. non Gaertn., nec Bernh.) 窃衣 (Ch'i I; Steal-clothes) (G.M. 1093). Erect annual, to 1 m.; fls. white, V–VII. Eurasia, Africa; locally in An., Che., Hun., Hup., Ku. Roadsides, field margins. Fig. 273.
2. **Torilis scabra** (Thunb.) DC. (DC.P. 4:219). Brg. herb; fls. white. Japan and China, widely introduced; locally in An., Ki., Ku., Che. Waste ground.

4. **Daucus** Linn. Carrot 胡萝蔔属 (Hu Lo Fu Shu)

Erect hispid *annuals or biennials* with finely divided pinnately decompound lvs. and *multi-cleft* leaf-like *involucral bracts*: fls. white or tinged reddish, *in large* compound *umbels*; petals obovate, those of the outer fls. often enlarged and 2-lobed: *fr.* oblong, *flattened dorsally*, with 5 bristly primary ribs and four prickly-winged secondary ones. 25 species, widely distributed; one in China. (Greek: *daukos*, a kind of parsnip or carrot.)

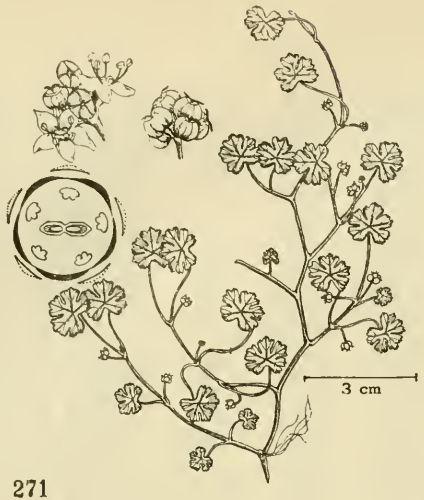
1. **Daucus carota** Linn. 胡萝蔔 (Hu Lo Fu; Mongolian Radish) (G.M. 1104). Erect biennial, to 3 m.; fls. white, in a flat or concave umbel, V–VII; fr. VI–VIII. Eurasia, naturalized in North America and Australia; locally in Hun., Hup., Ki., Ku. Roadsides and field margins.

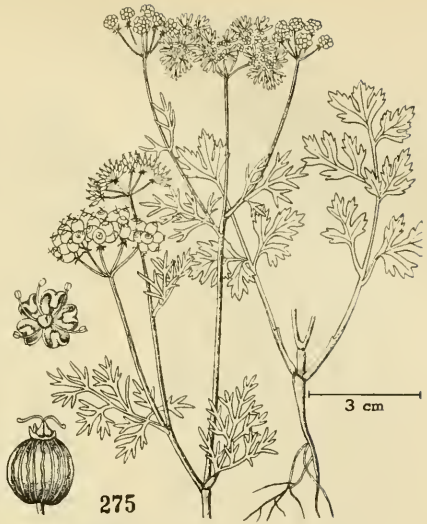
1a. **Daucus carota** Linn. var. **sativa** DC. Cultivated Carrot (B.M. 752). Brg. herb, to 1 m.; fls. white, in a somewhat globose umbel. Introduced in China and cultivated as a root vegetable.

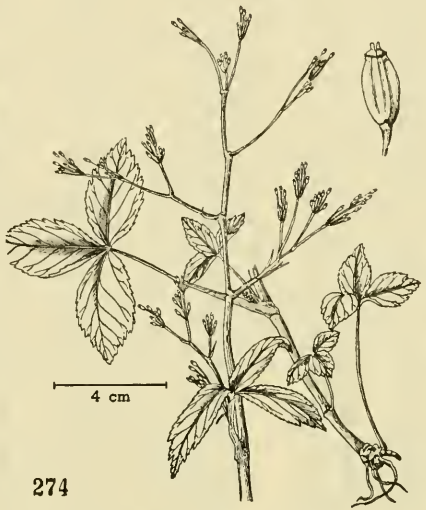
5. **Bupleurum** Linn. Thorough-wax 柴胡属 (Ch'ai Hu Shu; Offering-for-long-life)

Annual or perennial (ours) herbs with *simple entire* (in ours *linear*) *lvs.*: *fls. yellow* or greenish, in compound umbels; involucels of 5 conspicuous ovate mucronate bractlets: fr. *oblong*, with slender equal ribs. 65 species, widely distributed; 15 in China. (Greek: *bous*, ox; and *pleuron*, rib; referring to the nerved leaves.)

1. **Bupleurum falcatum** Linn. 北柴胡 (Pei Ch'ai Hu) (Mak.F. 278). Slender herb, to 1 m.; fls. yellow, VII. Eurasia; locally in Hup., Ku. Grassland.







271. Hydrocotyle sibthorpoides
272. Sanicula chinensis

273. Torilis japonica
274. Cryptotaenia canadensis

275. Coriandrum sativum
276. Foeniculum vulgare

6. **Osmorhiza** Raf. Sweet Cicely 香根草属 (Hsiang Kên Ts'ao Shu)

Erect perennial herbs from thick aromatic fascicled roots: lvs. ternate or biternate; leaflets multicleft; petioles sheathing: infl. in compound umbels; involucre wanting but involucel present (ours); rays few and unequal; fls. white (ours), purple or greenish yellow; calyx teeth obsolete: *fr. linear to clavate, bristly hispid* (ours) or glabrate, *bearing* conspicuous *tails at the base*; ribs filiform, bristly; *carpels curving outward.* 11 species, mostly in North America, four in South America, one in eastern Asia. (Greek: *osme*, a cent, and *rhiza*, root.)

1. **Osmorhiza aristata** (Thunb.) Mak. & Yabe (Cal.B. 23:127). Stout herb, 3–8 dm. high; fls. white; involucel conspicuous. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Woodland shade.

7. **Anthriscus** Hoffm. Chervil 安絲属 (An Ssŭ Shu)

Erect annual, biennial or perennial *herbs* from taproots or fascicled fibrous roots: lvs. ternate-pinnately or pinnately compound: infl. of compound umbels; involucre usually wanting but *involucel conspicuous*; rays few; *fls. white*; calyx teeth obsolete: *fr. linear to lanceolate* (ours), compressed laterally, *beaked*; *ribs and oil tubes obsolete.* About 10 species in Eurasia; only 2 reported from China. (Greek: *anthriskos.*)

1. **Anthriscus sylvestris** (L.) Hoffm. (G.M. 1091). Stout annual, 6–15 dm. high; fls. white. Eurasia, naturalized in North America, presumably introduced in Che. Waste places.

8. **Cryptotaenia** DC. Honewort 鴨兕芹属 (Ya Êrh Ch'in Shu)

Perennial glabrous herbs with ternate lvs.: fls. white, in irregularly compound or paniculate umbels; involucels usually wanting: *fr.* oblong, *beakless*, *glabrous*, blunt at base, not strongly compressed; carpels nearly terete. One species in eastern North America and eastern Asia, one or more additional species in Africa. (Greek: *crypto*, hidden, and *tainia*, thread, referring to the concealed oil tubes.)

1. **Cryptotaenia canadensis** (L.) DC. var. **japonica** (Hassk.) Mak. 鴨兕芹 (Ya Êrh Ch'in; Duck Celery) (E.P.IV. 228(3):112). Erect perennial, to 1 m.; fls. white, V–VII: fr. VII–IX. Eastern Asia; locally in An., Che., Hun., Hup., Ki. Woodland shade. Fig. 274.

9. **Coriandrum** Linn. Coriander 胡荽属 (Hu Sui Shu)

Glabrous *annuals* with decompound lvs. finely divided into filiform segments: fls. white, in compound umbels, without involucres: *fr. subglobose*, with indistinct ribs; pericarp very thin and hard. 2 species, in the warm parts of the Old World; one in China. (The old Latin name.)

1. **Coriandrum sativum** Linn. Coriander 芫荽 (Yüan Sui; Foreign-aromatic-vegetable) (B.M. 753). Erect annual, to 8 dm.; fls. white; stem-lf. segments linear. Southern Europe, naturalized in North America and Africa; locally in Ku. Cultivated, condiment. Fig. 275.

10. **Pimpinella** Linn. 茴芹属 (Hui Ch'in Shu)

Herbs, usually *perennial*, from slender taproots: *lvs.* commonly *ternately* or pinnately compound, the *stem-lvs.* often *heteromorphic*: infl. of compound umbels; in-

volucre usually wanting; involucel wanting or inconspicuous; fls. white or tinged with color; *ovaries pubescent*; *marginal fls.* usually *radiant*: *fr. compressed laterally*, glabrous to pubescent. More than 100 species in Eurasia, perhaps a dozen from China. (The old Latin name.)

1. **Pimpinella diversifolia** DC. (DC.P. 4:122). Perennial herb; fls. white; basal lvs. simple or ternate, the upper dissected. Eurasia; locally in Che. Moist ground.

11. **Foeniculum** Adans. Fennel 蒿香属 (Huai Hsiang Shu)

Stout erect *glaucous anise-scented* biennial or perennial herbs with pinnately decompound lvs.: *lf. segments* linear or *filiform*: *fls. yellow*, in compound umbels; *involucels absent*; *ovaries glabrous*: fr. oblong, not strongly compressed, with prominent ribs; oil tubes solitary between the ribs. 4 species, in the eastern hemisphere; 1 in China. (Latin: diminutive of *foenum*, hay, from its odor.)

1. **Foeniculum vulgare** Mill. Fennel 蒿香 (Huai Hsiang) (B.M. 751). Erect perennial, to 2 m.; fls. yellow, VII; fr. VIII. Southern Europe, naturalized in North America, Africa, New Zealand and Australia; locally in An., Hun., Ki., Ku. Cultivated, condiment. Fig. 276.

12. **Petroselinum** Hoffm. 荷蘭芹属 (Ho Lan Ch'in Shu)

Annual, biennial or perennial, *green parsley-scented herbs* with *ternately* decompound lvs.: *fls.* reddish or *greenish yellow*, in compound umbels; ovaries glabrous; *involucel present*: fr. ovoid to oblong, laterally compressed, the *carpels curving outward* and joined only at the base and apex. 6 species, in Europe; one cultivated in China. (Greek: *petro*, rock, and *selinon*, parsley.

1. **Petroselinum crispum** (Mill.) Mansf. (*P. hortense* Hoffm.) Parsley 荷蘭芹 (Ho Lan Ch'in; Holland Celery) (B.M. 753). Bushy herb, to 8 dm.; fls. greenish yellow. Introduced from Europe; locally in An., Che., Ku. Cultivated, vegetable.

13. **Apium** Linn. 芹属 (Ch'in Shu)

Annual or perennial herbs with pinnately or ternately decompound lvs.: fls. white, in compound umbels; *involucre and involucels wanting*: fr. broader than long, laterally compressed. 20 species, widely distributed in temperate regions; 2 in China. (The Latin name for parsley.)

1. **Apium graveolens** Linn. var. **dulce** DC. 芹菜 (Ch'in Ts'ai; Celery) (B.M. 755). Erect biennial; fls. white. Presumably from the Mediterranean region, introduced in Ku. Cultivated, vegetable.

14. **Oenanthe** Linn. 水芹属 (Shui Ch'in Shu)

Herbs, *growing in wet places*, with fibrous or fascicled tuberous roots and 1–3-pinnate *lvs.* which are *toothed* but not dissected (rarely reduced to a naked petiole): fls. often polygamous, white, the staminate sometimes unequally rayed; *calyx teeth* prominent, acute, *persistent*; petals notched or bilobed; *styles* slender, erect, *persistent*; ovary glabrous: *fr.* cylindric or globose, usually subterete, *with* low, *corky ribs*; mericarps with a flat inner face. 30 species, in the northern hemisphere and South Africa; 6 in China.

Key to the Species

Lf. segments of stem leaves ovate-lanceolate: fr. oblong ..... 1. *O. stolonifera*
Lf. segments of stem leaves linear: fr. globose ..... 2. *O. linearis*

1. **Oenanthe stolonifera** DC. 水芹 (Shui Ch'in; Water-celery) (Mak.F. 274). Herb, to 5 dm.; fls. VI–VII. Southeastern Asia; locally in An., Che., Hup., Ku. Cultivated. Fig. 277.
2. **Oenanthe linearis** Wall. ex DC. (DC.P. 4:138). Herb, to 6 dm.; fls. white. Southeastern Asia; locally in An. Margins of rice fields.

15. **Sium** Linn. Water Parsnip 澤芹属 (Tzŭ Ch'in Shu)

Glabrous perennial herbs, *growing in wet places*: *lvs. pinnate* or decompound: *involucre and involucel prominent*; fls. white, in compound umbels; calyx teeth prominent: *fr. compressed laterally*, oval to orbicular, with prominent, *corky ribs*. 8 species, in northern hemisphere and Africa; 1 in China. (Greek name of some marsh plant.)

1. **Sium suave** Walt. (G.M. 1097). Stout herb, to 1 m.; fls. white. Eurasia and North America; locally in Ku. Wet banks.

16. **Ligusticum** Linn. Lovage 当帰属 (Tan Kuei Shu; Ought-to-return Genus)

Perennial herbs with 1–3-pinnate or -ternate lvs.; *lfts. deeply incised*: fls. white, in compound umbels; petals notched or bilobed: *fr.* oblong to ellipsoid, somewhat *compressed laterally*; *mericarps* somewhat *flattened dorsally*; the *dorsal ribs prominent* and *sometimes narrowly winged*. 20–30 species, northern hemisphere; 17 reported in China. (Named for the Italian province of Liguria.)

Key to the Species

Flg. rays about 25, 6 cm. long; involucral bracts few, scabrid, white-margined ..... 1. *L. kiangsiense*
Flg. rays about 15, 4 cm. long; involucral bracts 2, subglabrous ..... 2. *L. kulingense*

1. **Ligusticum kiangsiense** Wolff (Fe.R. 27:326). Erect perennial, to 1 m. or more; fls. white, VIII. East-central China; locally in An., Ki., Ku. Grassland.
2. **Ligusticum kulingense** Wolff (Fe.R. 27:314). Erect perennial, to 1 m.; fls. white, VIII; fr. IX–X. East-central China; locally in Ki. Grassland.

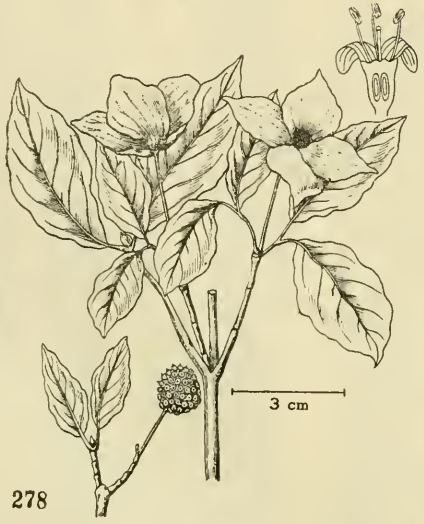
17. **Tongoloa** Wolff 東鵝落属 (Tung O Lo Shu)

Slender erect *glabrous perennials*: *lvs. ternate-pinnately dissected*, the ultimate divisions narrow: *fls. white to red*, in compound umbels: *fr. ovoid-oblong, truncate, constricted at the commissure*; the ribs filiform. About 6 species, all in China, Tibet, and vicinity. (Named for *Tongolo*, the locality in eastern Tibet from which *T. gracilis* was described.)

1. **Tongoloa stewardii** Wolff (Fe.R. 27:185). Erect perennial, 60 cm. high; fls. white; fr. subdidymo-ovoid. East-central China; locally in Ki. Damp ground.

18. **Changium** Wolff 張氏芹属 (Chang Shih Ch'in Shu)

Slender *glaucous subscapose* perennials, *from a tuberous root*: *basal lvs. ternately compound*; the *stem lvs.* small and *reduced*: involucre wanting; involucel of linear



277. Oenanthe stolonifera
278. Cornus kousa
279. Pyrola rotundifolia
280. Rhododendron molle
281. Enkianthus chinensis
282. Lyonia ovalifolia

bractlets; *fls. white*, in compound umbels; the *lateral umbels often sterile*: *fr. suborbicular, constricted at the commissure*; the ribs indistinct. A single species, of southeastern China. (Named for T.S. Chang who collected the type species in Chekiang.)

1. **Changium smyrnioides** Wolff 闊党参 (Min Tang Sêng) (Fe.R. 19:315). Glaucous subscapose perennial, to 1.5 m.; fls. white. Southeastern China; locally in An., Che., Ku. Medicinal.

19. **Cnidium** Cusson 蛇床属 (Shê Ch'uang Shu)

Branched *annual* or perennial herbs with pinnately dissected lvs.: fls. white or rose-tinged, in compound many-rayed umbels; petals notched or bilobed: *fr. small* (to 3 mm. long), ovoid or oblong, *flattened dorsally*; the *ribs all about equally corky-winged.* About 20 species, in Eurasia; 6 in China.

1. **Cnidium monnieri** (L.) Cusson (*Selinum monnieri* Linn.) 蛇床 (Shê Ch'uang; Snake-bed) (Hegi 5(2):1304). Erect annual, to 5 dm.; fls. white, VII–VIII. Northern Asia; locally in An., Hup., Ki., Ku. Grassland.

20. **Heracleum** Linn. Cow-parsnip 花土当帰属 (Hua T'u Tan Kuei Shu)

Robust pubescent *perennial* herbs with ridged hollow stems up to 5 cm. in diam. at the base: lvs. ternate: infl. in compound umbels; *involucre* deciduous or none; rays about 15, unequal; fls. white or pinkish; *marginal fls. radiant*; calyx teeth obsolete: *fr. 5–10 mm. long*, with broad lateral wings and externally visible oil tubes. About 60 species, north temperate zone; several in China. (Greek: *Heraklees*, Hercules.)

1. **Heracleum tiliifolium** Wolff (Fe.R. 33:80). Stout herb, to 1.5 m.; fls. white. East-central China; locally in Ki. Brushland.

21. **Pastinaca** Linn. Parsnip 蔞蒿属 (Lu Fu Shu)

Stout tall biennial or perennial herbs with thick roots and pinnately compound lvs.: *fls. yellow* or red, in compound umbels; *involucels wanting*: fr. glabrous, oval or oblong, strongly flattened dorsally; the *lateral ribs broadly winged.* About 12 species, in Eurasia; one cultivated in China. (Latin: *pastus*, food.)

1. **Pastinaca sativa** Linn. Parsnip 蔞蒿 (Lu Fu; Reed-turnip) (B.M. 752). Stout biennial; fls. yellow, VI; fr. VII–VIII. Europe, introduced in Ku. Cultivated, root vegetable.

22. **Angelica** Linn. 独活属 (Tu Ho Shu; The-one-living Genus)

Stout perennials with compound lvs.: *fls. white or rose-tinged*, in large compound terminal umbels with scant involucres but prominent involucels: *fr.* oval to orbicular, *strongly flattened dorsally*; the *lateral ribs broadly winged*, and the *dorsal ribs also prominent.* About 50 species, in the northern hemisphere; 25 in China. (Named *angelic* for its strengthening and healing properties.)

Key to the Species

Plants very stout: lfts. serrate; upper stem lvs. reduced to conspicuously inflated sheaths: ovaries tomentose ..... 1. *A. dahurica*

Plants slender: lfts. lobed; upper stem lvs. few or inconspicuous: ovaries glabrous ..... 2. *A. grosseserrata*

1. **Angelica dahurica** (Fisch.) Fr. & Sav. (*Callisace dahurica* Fisch.) (DC.P. 4:184). Stout perennial; fls. white. Transbaicalia to eastern China; locally in Che., Hup. Open ground.
2. **Angelica grosseserrata** Maxim. (St.P.B. 19:275). Slender perennial, to 2 m.; fls. white. Northern and eastern China; locally in Che., Ku. Open places.

23. **Peucedanum** Linn. 前胡属 (Ch'ien Hu Shu)

Mostly *perennial* herbs with pinnatisect lvs.: fls. white to purple, greenish or yellowish, in compound umbels; petals obovate, notched or bilobed: fr. strongly flattened dorsally; the *lateral ribs corky-thickened* and *narrowly winged*, the dorsal ribs filiform. About 100 species, in Eurasia and Africa; 15 in China. Latin: *Peucedanum*, hog's fennel.)

Key to the Species

Lvs. with a serrate winged rachis: petals purplish	1.	*P. decursivum*
Lvs. without a winged rachis: petals white.		
Ovaries glabrous	2.	*P. terebinthaceum*
Ovaries pubescent	3.	*P. formosanum*

1. **Peucedanum decursivum** (Miq.) Maxim. 前胡 (Ch'ien Hu; First-long-life) (Mak.F. 266). Stout herb, to 2 m.; fls. purplish. Eastern Asia; locally in An., Che., Hun., Hup., Ki. Shady woods.
2. **Peucedanum terebinthaceum** (Fisch.) Fr. & Sav. (Le.F. 2:314). Slender herb, 1–2 m.; fls. white. Eastern Asia; locally in An., Hup., Ku. Mountain slopes.
3. **Peucedanum formosanum** Hayata (Hay. 10:22). Stout perennial, 1–3 m.; fls. white. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Mountain thickets.

132. **CORNACEAE** Dogwood Family 四照花科 (Ssŭ Chao Hua K'o)

Hermaphrodite or dioecious trees or shrubs, rarely herbs, with mostly *estipulate lvs.* and epigynous *fls.*, *not in umbels*; calyx lobes and petals *usually 4 or 5*; stamens the same number, on the margin of a disk; ovary inferior, usually 2-celled: *fr. a drupe or berry*. 10 genera with 90 species, of temperate and subtropical regions, mostly in the northern hemisphere; 4 genera and 30 species in China.

Key to the Genera

A. Fls. borne on the upper surface of the lvs.; dioecious: lvs. deciduous, alternate	1.	*Helwingia*
AA. Fls. borne in axillary or terminal infl.		
Lvs. alternate, deciduous		*Cornus controversa*
Lvs. opposite.		
Lvs. deciduous: fls. in corymbs or umbels, bisexual	2.	*Cornus* (in part)
Lvs. evergreen: fls. in terminal panicles; dioecious	3.	*Aucuba*

1. **Helwingia** Willd. 葉長花属 (Yeh Chang Hua Shu)

Dioecious deciduous *shrubs* with *alternate serrate lvs.* and small 4-(3–5-)merous *fls. borne* in fascicles *on the upper surface of the lvs.*: fr. a berry-like drupe with 1–4 stones. 3 species, in Asia; all occurring in China. (For G. A. Helwing, 1666–1748, a German clergyman and botanical author.)

1. **Helwingia japonica** Dietr. 葉長花 (Yeh Chang Hua; Leaf-borne Flower) (R.M. 681). Shrub, to 1.5 m.; fls. greenish white, IV–VI; fr. black, VIII. Japan, China;

locally in An., Che., Hup., Ki. Forest.

2. **Cornus** Linn. Dogwood 四照花属 (Ssŭ Chao Hua Shu)

Usually deciduous trees or shrubs, rarely herbs, with *entire lvs.* and small *perfect* 4-merous *fls. in terminal cymes or heads* which are often surrounded by large petaloid involucral bracts; ovary 2-celled: fr. a drupe with a 2-celled stone. 40 species, north temperate regions; 23 in China. (The old Latin name of *Cornus mas.*)

Key to the Species

a. Fls. in cymes or panicles, without an involucre.
  Lvs. alternate, abruptly acuminate, with 6-9 prs. of veins ..... 1. *C. controversa*
  Lvs. opposite, long acuminate.
    Fls. in broad panicles, 8-14 cm. across: lvs. 10-16 cm. long, with 6-8 prs. of veins, glaucous beneath ..... 2. *C. macrophylla*
    Fls. in flat-topped cymes, 5-7 cm. across: lvs. smaller, with 4-5 prs. of veins, pale green beneath ..... 3. *C. walteri*
aa. Fls. in dense globose heads, with an involucre..... 4. *C. kousa*

1. **Cornus controversa** Hemsl. 瑞木 (Shui Mu; Wood-of-good-omen) (R.M. 683). Tree, to 20 m.; fls. V; fr. bluish black, VIII–IX. China, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Forest.
2. **Cornus macrophylla** Wall. 梾木 (Lai Mu) (R.M. 686). Tree, to 15 m.; fls. yellowish white, VII–VIII; fr. bluish black, X. China, Japan; locally in Che., Ku. Forest.
3. **Cornus walteri** Wangerin 毛梾 (Mao Lai; Small Cornus) (R.M. 687). Tree, to 12 m.; fls. VI; fr. black, IX–X. Central China; locally in An., Hup., Ku., Ki. Woodland.
4. **Cornus kousa** Hance (*Benthamia japonica* Sieb. & Zucc.) Flowering Dogwood 四照花 (Ssŭ Chao Hua; Four-directions-light Flower) (R.M. 688). Tree, to 7 m.; fls. white, in globose heads subtended by large white or cream-colored bracts, VI; fr. red. VIII. Japan, Korea, China; locally in An., Che., Hup., Ki., Ku. Woodland. Fig. 278.

3. **Aucuba** Thunb.

Glabrous *evergreen* shrubs with stout dichotomous brs. and opposite petiolate lvs. which darken in drying: dioecious; *fls. in terminal panicles*, 4-merous; ovary 1-celled and 1-ovuled: fr. a 1-seeded berry-like drupe. 3 species in eastern Asia and the Himalayas; all occurring in China. (*Aucu-ba*, the Japanese name.)

Key to the Species

Lvs. abruptly long- acuminate at apex: petals with slender acuminate tips. 1. *A. chinensis*
Lvs. mostly obtuse at apex: petals with acute but rounded tips ..... 2. *A. japonica*

1. **Aucuba chinensis** Benth. (R.M. 682). Shrub or small tree; fr. IX. China; locally in Hun. Forest.
2. **Aucuba japonica** Thunb. (R.M. 681). Shrub, to 5 m.; fls. III–V; fr. scarlet, VIII–X. Japan, Korea; locally in Ku. Planted, ornamental.

2a. **Aucuba japonica** f. **variegata** (D'Ombr.) Rehd. (*Aucuba japonica* var. *variegata* D'Ombr.) Gold-dust Tree (B.M. 757). Lvs. with numerous small yellow spots. China; locally in Ku. Planted, ornamental.

2. **METACHLAMYDEAE** (Gamopetalae) 合瓣花区 (Ho Pan Hua Ch'iu)

Calyx and corolla both present; the petals more or less united.

133. **CLETHRACEAE** White Alder Family 山柳科 (Shan Liu K'o)

Shrubs or trees with stellate pubescence: lvs. alternate, short-petiolate, estipulate, serrate: fls. in terminal or axillary racemes or panicles; sepals and *petals* 5, *distinct*; stamens 10, hypogynous; anthers opening by pores; ovary superior, 3- or 5-celled; style *slender*, 3-cleft or simple: *fr.* a *3- or 5-valved* many-seeded capsule. 2 genera with about 30 species.

1. **Clethra** Linn. White Alder 山柳属 (Shan Liu Shu; Mountain-willow Genus)

Inflorescence terminal; *sepals entire*, accrescent and persistent; *ovary* and capsule *3-celled*. 30 species, chiefly in the Americas, eastern Asia and Malaya; 10–15 in China. (Greek: *klethra*, alder.)

Key to the Species

Lvs. stellate-tomentose beneath; blades 10–16 cm. long	1. *C. brammeriana*
Lvs. pubescent or nearly glabrous beneath; blades 6–14 cm. long	2. *C. fargesii*

1. **Clethra brammeriana** Hand.-Mazz. (H.-M. 7:761). Shrub; fls. white; infl. brown-tomentose. Central China; locally in Ki. Woodland.
2. **Clethra fargesii** Franch. (R.M. 690). Shrub, to 4 m.; fls. white, fragrant, VIII; infl. brown-pubescent. Central China; locally in An., Hup. Woodland.

134. **PYROLACEAE** Wintergreen Family 鹿蹄草科 (Lu T'i Ts'ao K'o)

Herbs or low shrubs, sometimes parasitic, with *alternate simple* estipulate *lvs.* and *perfect regular* 5-merous polypetalous *fls.*: infl. solitary or of terminal clusters; stamens 10, distinct to the base; anthers often opening by apical pores; style and stigma one: fr. a 5-valved capsule with many seeds. 10 genera with 32 species, in the arctic and temperate regions; 3 genera and 5 species in China.

1. **Pyrola** Linn. Wintergreen 鹿蹄草属 (Lu T'i Ts'ao Shu)

Low glabrous perennial *herbs* with evergreen basal lvs. and nodding fls. in a simple raceme on an erect scape; petals 5, distinct; *anthers opening by 2 pores at the base*; style 1; stigma 5-lobed or -parted: capsule loculicidal, opening from the base upward; seeds minute. About 15 species, in northern regions; 3 in China. (The name is the diminutive of *Pyrus*, on account of the supposed resemblance of the foliage to that of the pear tree.)

1. **Pyrola rotundifolia** Linn. 鹿蹄草 (Lu T'i Ts'ao; Stag-hoof Herb) (G.M. 1112). Scape 5–25 cm. high; fls. white, VI; fr. VII. Eurasia, North America; locally in Ki. Woodland shade. Fig. 279.

135. **ERICACEAE** Heath Family 杜鵑科 (Tu Chüan K'o)

Shrubs or small trees, often evergreen, with estipulate lvs. and perfect often showy 4–5-merous fls.; corolla usually gamopetalous; *stamens at the base of a disk*; anthers opening mostly by pores; ovary 2–5-celled; *style* and stigma *one*: fr. a capsule or berry with small seeds. 70 genera with 1900 species; in cold and temperate regions; 14 genera and 280 species in China.

Key to the Genera

A. Ovary superior: fr. a capsule.
  B. Capsule septicidal: fls. large: anthers exserted ..... 1. *Rhododendron*
  BB. Capsule loculicidal: fls. smaller; anthers included.
    Anthers awned.
      Awns of the anthers upright; fls. in racemes or umbels: lvs. rounded or obtuse at the tips, crowded at the ends of the brs ..... 2. *Enkianthus*
      Awns of the anthers reflexed; fls. in terminal panicles: lvs. ovate-acuminate, scattered ..... 3. *Pieris*
    Anthers not awned; fls. in axillary clusters ..... 4. *Lyonia*
AA. Ovary inferior: fr. a berry-like drupe crowned by the persistent calyx lobes ..... 5. *Vaccinium*

1. **Rhododendron** Linn. Rose Bay 杜鵑屬 (Tu Chüan Shu; Goatsucker Genus)

Shrubs or small trees with alternate mostly entire lvs. and *large showy* slightly irregular usually 5-merous *fls.* in terminal umbel-like clusters; stamens 5–10; *anthers exserted*, opening by apical pores; *ovary superior*: *fr. a* 5–10-celled *septicidally dehiscent* woody many-seeded *capsule*. Over 400 species in the cold and temperate regions of the northern hemisphere, and in the high mountains of tropical Asia and Malaysia; 220 species in China. (From the Greek *rhodon*, rose; and *dendron*, tree; the ancient name of *Nerium Oleander*.)

Key to the Species

a. Lvs. evergreen, coriaceous.
  Lvs. glabrous: capsules furrowed longitudinally.
    Lvs. 3–6 cm. long, ovate-lanceolate: corolla 5-lobed: capsule curved ..... 1. *R. anhweiense*
    Lvs. 7–17 cm. long, oblong-elliptic: corolla 7-lobed: capsule obliquely attached at base, but not curved ..... 2. *R. fortunei*
    Lvs. puberulous on midrib and petiole, ovate, 4–5 cm. long: corolla 5-lobed: capsule bristly, ovoid ..... 3. *R. ovatum*
aa. Lvs. deciduous, more or less pubescent.
  b. Fls. and lvs. from the same bud; fls. purple, rose-colored, red or white, not yellow.
    Brts. glabrous or villose, but without flat setose hairs: fls. pale purple or rose-colored; calyx deciduous: capsule short-cylindric, gray- or brown-pubescent ..... 4. *R. mariesii*
    Brts. covered with flat setose hairs.
      Fls. white; calyx glandular-hairy: capsule conic-ovoid, shorter than the persistent calyx ..... 5. *R. mucronatum*
      Fls. red; calyx covered with long rusty-brown flat hairs, not glandular: capsule ovoid, setose, with persistent calyx at base ..... 6. *R. simsii*
  bb. Fls. yellow, from the terminal bud: lvs. from lateral buds: calyx persistent, pubescent and bristly-ciliate, but not glandular: capsule cylindric-oblong, furrowed longitudinally, finely pubescent or nearly glabrous ..... 7. *R. molle*

1. **Rhododendron anhweiense** Wils. (AA.J. 6:163). Shrub with stout brs.; fr. VIII. East-central China; locally in An. Woodland.

2. **Rhododendron fortunei** Lindl. 天目杜鵑 (T'ien Mu Tu Chüan; T'ien Mu Rhododendron, from the area of T'ien Mu Shan, Chekiang) (R.M. 701). Shrub, to 4 m.; fls. rose-lilac, V–VI; fr. VII–VIII. East-central China; locally in An., Che., Ki. Forest.
3. **Rhododendron ovatum** (Lindl.) Planch. 馬銀花 (Ma Ying Hua; Silver-horse Flower) (R.M. 692). Shrub, to 2 m.; fls. pale purple, pink, white, IV–V; fr. VIII–X. East-central China; locally in An., Che., Ki., Ku. Woods, brushland.
4. **Rhododendron mariesii** Hemsl. & Wils. 満山紅 (Man Shan Hung; Ubiquitous Mountain-red) (W.&.R.Az. 80). Shrub, to 3 m.; fls. rose-purple, IV–V; fr. VII–VIII. Central China; locally in An., Che., Ki., Ku. Woods, brushland.
5. **Rhododendron mucronatum** G. Don. 白杜鵑 (Pai Tu Chüan; White Azalea) (R.M. 715). Shrub, 2–3 m. high; fls. white, III–IV. Introduced from Japan; locally in Ku. Planted, ornamental.
6. **Rhododendron simsii** Planch. 映山紅 (Ying Shan Hung; Reflecting Mountain-red) (R.M. 714). Shrub, to 3 m.; fls. red, IV–V; fr. VIII–IX. China, Formosa; locally in An., Che., Hun., Ki., Ku. Woods, brushland.
7. **Rhododendron molle** (Bl.) G. Don (*R. sinense* Sweet) 黃杜鵑 (Huang Tu Chüan; Yellow Azalea) (R.M. 719). Shrub, to 4 m.; fls. yellow, IV–V; fr. VII–VIII. Eastern and central China; locally in An., Che., Hun., Hup., Ki., Ku. Woods, brushland. Fig. 280.

2. **Enkianthus** Lour. 吊鐘花属 (Tiao Chung Hua Shu; Hanging-bell Flower Genus)

Shrubs with whorled brs. and *alternate rounded or obtuse* serrulate *lvs. crowded at the tips of the brs.*: *fls.* 5-merous, *in* terminal pendulous or nodding racemes or umbels; corolla campanulate or urceolate, white to red; stamens 10; *anthers* included, opening by short slits, *with upright awns*: fr. a 5-celled loculicidally dehiscent capsule with 1-few angled or winged seed in each cell. 10 species, in Asia; 6 in China. (Greek: *egkyein*, to be pregnant; and *anthos*, flower: the large colored involucre of *E. quinqueflorus* resembles a flower enclosing smaller flowers.)

1. **Enkianthus chinensis** Franch. 満天星 (Man T'ien Hsing; Heaven-full-of-stars) (R.M. 730). Deciduous shrub or small tree; fls. salmon-red, V; fr. IX. China; locally in An., Hup. Forest. Fig. 281.

3. **Pieris** D. Don 馬酔木属 (Ma Tsui Mu Shu)

Evergreen shrubs or small trees with *scattered ovate-acuminate lvs.* and 5-merous *fls. in terminal panicles*; corolla ovoid or urceolate; stamens 10; *anthers* included, *with* a pair of *reflexed awns* on the back: fr. a globose 5-celled loculicidally dehiscent capsule, with numerous seeds in each cell. 8 species, in North America and Asia; 6 in China. (A name from Greek mythology.)

1. **Pieris japonica** D. Don 馬酔木 (Ma Tsui Mu; Horse-intoxicating Shrub) (R.M. 732). Evergreen shrub, to 3 m.; fls. IV–V; fr. IX. Japan, China; locally in An. Forest.

4. **Lyonia** Nutt. 梾木属 (Li Mu Shu)

Shrubs or small trees with alternate sometimes lepidote lvs. and *fls. in axillary clusters*; calyx 5-(rarely 4–8–) lobed; corolla urceolate or cylindric-campanulate; stamens 10 (rarely 8–16); *anthers included*, obtuse, *without awns*, opening by apical

pores; *ovary superior*: *fr. a* globose or ovoid loculicidally dehiscent *capsule* with thickened sutures. 30 species, in North America, West Indies, Asia; 1 in China. (Named for John Lyon, American botanist who died about 1818.)

1. **Lyonia ovalifolia** (Wall.) Drude (R.M. 734). Half-evergreen shrub or tree, to 12 m.; fls. white, V–VII; fr. IX–X. Himalayas, China, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Forest. Fig. 282.

5. **Vaccinium** Linn. Blueberry 越橘属 (Yüeh Chü Shu)

Shrubs or rarely small trees with alternate lvs. and 4–5-merous fls.; corolla cylindric, urceolate or campanulate; stamens 8–10, anthers opening at the top; *ovary inferior*, 4–10-celled: *fr.* many seeded, *berry-like, crowned by the persistent calyx teeth.* 130 species, in the northern hemisphere; 20 in China. (The old Latin name.)

Key to the Species

Bracts of the fls. lfy., ovate-lanceolate, 5–15 mm. long, persistent; corolla puberulent: fr. puberulent when young, becoming glaucous	1.	*V. bracteatum*
Bracts of the fls. linear or narrowly lanceolate, to 6 mm. long, caducous; corolla glabrous: fr. not glaucous.		
Fr. pubescent: brts. densely brown-tomentulose, becoming glabrescent: axes of infl. and calyces pubescent	2.	*V. iteophyllum*
Fr. glabrous: brts. usually glabrous, rarely gray-puberulent: axes of infl. and calyces glabrous	3.	*V. sprengelii*

1. **Vaccinium bracteatum** Thunb. 苞越橘 (Pao Yüeh Chü) (R.M. 754). Shrub, to 1.5 m.; fls. reddish, VI–VII; fr. blue-black, glaucous, IX. Japan, China; locally in An., Che., Hun., Hup., Ki., Ku. Brushland, woodland. Fig. 283.
2. **Vaccinium iteophyllum** Hance (ASNP IV. 18:223). Shrub, to 2 m.; fls. white, IV–V; fr. red, pubescent, VIII–IX. South China; locally in An., Che. Thickets.
3. **Vaccinium sprengelii** (Don) Sleumer (*V. donnianum* Wight, *V. mandarinorum* Diels) 米飯花 (Mi Fan Hua; Cooked-rice Flower) (R.M. 754). Shrub or tree, to 8 m.; fr. black, glabrous, VIII–IX. Himalaya, south China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland, forest.

136. **MYRSINACEAE** Myrsine Family 紫金牛科 (Tzŭ Chin Niu K'o)

Trees or shrubs with alternate estipulate coriaceous usually punctate lvs. and regular perfect or unisexual 4–5-merous fls.; calyx herbaceous; *corolla* usually *gamopetalous*; *stamens* 5, *opposite the corolla lobes*, and inserted on the corolla tube; style and stigma one: *ovules imbedded in the fleshy free central placenta*; *fr. a drupe or berry*. 32 genera with 1,000 species in tropical and subtropical countries; 6 genera and 65 species in China.

Additions and corrections to the treatment of *Myrsinaceae* have been contributed by Dr. Egbert H. Walker.

Key to the Genera

A. Ovary and fr. wholly superior, without bracteoles; seed solitary, globose.		
Corolla lobes twisted in the bud; infl. paniculate, corymbose or subumbellate	1.	*Ardisia*
Corolla lobes imbricate or valvate, not twisted in the bud; infl. racemose or fasciculate.		
Infl. of axillary racemes	2.	*Embelia*
Infl. umbellate or fasciculate on short lateral spurs	3.	*Myrsine*
AA. Ovary and fr. semi-inferior, with a pr. of bracteoles at base or on the pedicel; seeds numerous, angular.	4.	*Maesa*

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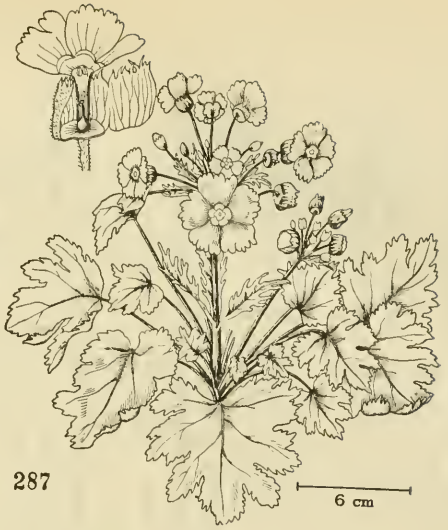

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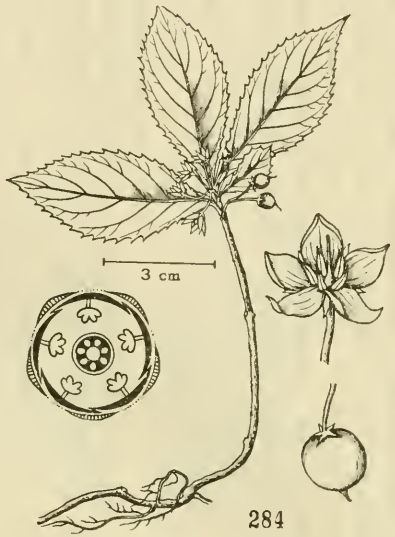

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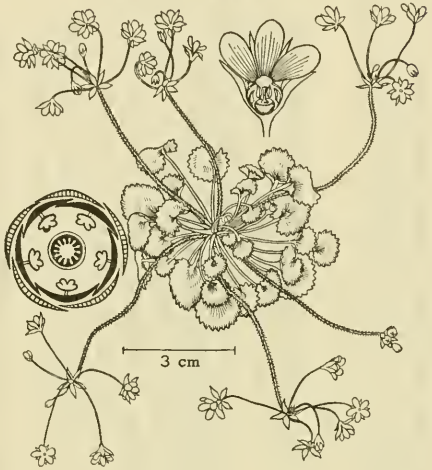

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283. Vaccinum bracteatum
284. Ardisia japonica

285. Maesa japonica
286. Androsace umbellata

287. Primula sinensis
288. Lysimachia clethroides

1. **Ardisia** Swartz 紫金牛属 (Tzŭ Chin Niu Shu)

Evergreen trees or shrubs with *fls.* usually umbellate or subumbellate; *corolla* generally 5-merous, *convolute* in the bud; stamens with very short broad filaments and large anthers opening by slits; *ovary superior*: fr. a 1-seeded drupe. 200 species, in warm countries; 35 in China. (Greek: *ardis*, point; referring to the pointed anthers.)

Key to the Species

a. Lf. margins entire or crisped, with resinous marginal glands, not serrate; stems essentially erect but sometimes from creeping rhizomes.
  b. Brts., petioles and lower lf. surfaces puberulent or minutely so; stems less than 40 cm. high.
    Lvs with 12-15 pairs of distinct lateral nerves sometimes uniting in an irregular nerve not close to margin ..... 1. *A. brevicaulis*
    Lvs. with about 4 pairs of rather indistinct lateral nerves not uniting ..... 2. *A. affinis*
  bb. Brts., petioles and lower lf. surfaces glabrous or essentially so; stems up to 1.5 m. high.
    Lf. blades rather coriaceous, distinctly punctate beneath; lateral nerves usually 12-20 pairs, usually uniting in a distinct marginal nerve ..... 3. *A. crenata*
    Lf. blades thinner, obscurely punctate beneath; lateral nerves usually 5-12, not uniting in a distinct marginal nerve..... 4. *A. crispa*
aa. Lf. margins serrate, without resinous marginal glands; stems decumbent or creeping.
  Sepals ovate or lanceolate, much shorter than the petals; brts., pedicels and petioles with minute or closely appressed pubescence ..... 5. *A. japonica*
  Sepals lanceolate, nearly equaling petals; brts., pedicels, petioles and lower leaf surfaces with long crisped hairs..... 6. *A. pusilla*

1. **Ardisia brevicaulis** Diels (Ph.J. 73:105). Shrub, 10–20 cm. high; fls. white or pink, VI; fr. red, X. Szechuan and Yunnan to Formosa; locally in Hun., Hup., Ki. Forest.
2. **Ardisia affinis** Hemsl. (Ph.J. 73:99). Erect shrub, to 40 cm. high; fls. pink, VI–VII; fr. red, X. South China; locally in Ki. Streamsides.
3. **Ardisia crenata** Sims (Ph.J. 73:112). Erect shrub, to 1.5 m.; fls. white or pink, VI–VII; fr. dark red, IX–X. Eastern Asia; locally in An., Che., Hun., Hup., Ki. Forest and widely cultivated.
4. **Ardisia crispa** (Thunb.) A.DC. 硃砂根 (Chu Sha Kên) (Ph.J. 73:118). Shrub, to 1.5 m.; fls. white or pink, VI–VII; fr. red or black, about 10 mm. in diam., XI. Japan, China; locally in An., Hun., Hup., Ki. Forest.
5. **Ardisia japonica** (Hornst.) Blume 紫金牛 (Tzŭ Chin Niu; Purple-gold Cow) (Ph.J. 73:134). Decumbent shrub, to 0.4 m.; fls. white or pink, VI–VII; fr. red, IX–V. Japan, China; locally in An., Che., Hun., Hup., Ki., Ku. Forest shade. Fig. 284.
6. **Ardisia pusilla** A.DC. (Ph.J. 73:132). Decumbent shrub, to 0.3 m.; fls. purple, VI; fr. red, X. Southeastern Asia, Philippines; locally in Ki. Forest shade.

2. **Embelia** Burm. f. 按培属 (An P'ei Shu)

Shrubs, usually forest lianas, rarely small trees, with simple entire or serrate

sometimes distichous lvs.: *infl. of axillary racemes*, occasionally compound or subfascicled; fls. small, unisexual, white or greenish yellow; *petals imbricated in the bud*, free or united at the base; stamens usually attached to base of petals; anthers generally punctate or verrucose on the back; fr. a globose or obovoid 1-seeded drupe. About 130 species in southeastern Asia, East Indies, Polynesia, Africa and Australia; 20 in China. (Named after a German traveller, Embel.)

1. **Embelia rudis** Hand.-Mazz. (Ph.J. 73:164). Climbing shrub; fls. creamy, yellow or greenish white, X–XI; fr. red to bluish-black, VII–VIII; veinlets raised reticulate. South China, Formosa; locally in Che., Ki. Forest.

3. **Myrsine** Linn. 鉄仔属 (T'ieh Tzŭ Shu)

Glabrous trees or shrubs with entire punctate lvs.: *infl. in axillary* umbels or *fascicles* on short scaly brs. or spurs; fls. perfect or dioecious; sepals glandular-ciliate on the margin; petals united at the base, usually pappilose on the margin and within; stamens inserted on the corolla; filaments short or obsolete: fr. a globular or ovoid 1-seeded drupe. About 140 species in subtropical and warm temperate regions; 5 in China. (From a name in Guiana, perhaps a native name.)

1. **Myrsine seguinii** Lév'l. (Ph.J. 73:202; Bo.Ma.T. 67:252). Shrub or tree, 2–12 m. high; fls. white or greenish, VI–VII; fr. blue-black, X; lf. blades oblong-lanceolate 5–10 cm. long. Japan, southern China, Indo-China; locally in Che., Ki., Hun. Forest.

4. **Maesa** Forsk. 杜莖山属 (Tu Hêng Shan Shu)

Trees or shrubs with 4–5-merous *fls. in* axillary or terminal bracteate *racemes*; *petals* white, *imbricate*; stamens 5, inserted on the corolla tube; *ovary mostly inferior*: fr. a globose many-seeded berry. 35 species, in the eastern tropical region; 9 in China. (From *Maas*, the Arabic name.)

1. **Maesa japonica** (Thunb.) Moritzi (*M. doraena* Blume) 杜莖山 (Tu Hêng Shan) (Ph.J. 73:19). Shrub, to 3 m.; fls. white, V; fr. yellow, IX; fr. and bracteoles dark glandular-striate. Japan, south China, Indo-China; locally in An., Che., Ki., Hun., Hup. Woodland. Fig. 285.

137. **PRIMULACEAE** Primrose Family 櫻草科 (Ying Ts'ao K'o)

Herbs with simple estipulate lvs. and regular perfect 5-merous fls.; *calyx herbaceous;* corolla usually gamopetalous; *stamens* 5, *opposite the lobes of the corolla* and inserted on the tube; ovary 1-celled, usually superior; *style* and stigma *one*: *fr. a* dehiscent *capsule*, 28 genera with 800 species, most abundant in the northern hemisphere. 10 genera and over 170 species in China.

Key to the Genera

A. Plants scapose: lvs. basal.
  Tube of the corolla shorter than the calyx ..... 1. *Androsace*
  Tube of the corolla longer than the calyx ..... 2. *Primula*
AA. Plants with lfy. stems.
  Lvs. dimorphic; smaller sessile ones on the erect flg. stems; larger petiolate ones at the base ..... 3. *Stimpsonia*
  Lvs. of one form, often larger below ..... 4. *Lysimachia*

1. **Androsace** Linn. Rock Jasmine 点地梅属 (Tien Ti Mei Shu)

Small *scapose* herbs with clustered *basal lvs.* and very small fls., often in umbels;

corolla constricted at the throat; the *tube of the corolla shorter than the calyx*: capsule 5-valved. 85 species, in Eurasia and North America; 25 in China. (An old Greek name.)

1. **Androsace umbellata** (Lour.) Merr. (*A. saxifragifolia* Bunge) 地錢草 (Ti Ch'ien Ts'ao; Earth-coin Herb) (H.F. 3:496; M.E. 3:274). Rosette herb; fls. white, IV–V. Eastern Asia; locally in An., Che., Hup., Ku. Open ground. Fig. 286.

2. **Primula** Linn. Primrose 櫻草属 (Ying Ts'ao Shu)

Scapose perennial herbs with *basal lvs.* and dimorphic fls. in umbel- or head-like clusters; *tube of the corolla longer than the calyx*; stamens included, the filaments very short: capsule 5–10-valved. 300 species, mostly in the north temperate regions; 100 in China. (Diminutive of *primus*, first; referring to its early blooming.)

Key to the Species

Fls. small, about 1 cm. across ..... 1. *P. malacoides*
Fls. large, 3-4 cm. across ..... 2. *P. sinensis*

1. **Primula malacoides** Franch. Fairy Primrose 報春花 (Pao Ch'un Hua) (B.M. 779). Herb, to 0.5 m.; fls. rose-colored and lilac, III. China; locally in Ku. Planted, ornamental.
2. **Primula sinensis** Lindl. Chinese Primrose 華櫻草 (Hua Yin Ts'ao) (B.M. 780). Herb, to 3 dm.; fls. white, pink, red or purplish, III. China; locally in Ku. Planted, ornamental. Fig. 287.

3. **Stimpsonia** Wright ex A. Gray 施丁草属 (Shih Ting Ts'ao Shu)

Slender *lfy.-stemmed* annual with *alternate dimorphic lvs.*; smaller sessile ones on the erect flg. stems; larger petiolate ones at the base: *fls. minute* and solitary *in the upper axils*; tube of the corolla short: capsule globose, 5-valved, many-seeded. One species, in eastern Asia.

1. **Stimpsonia chamaedryoides** C. Wright (Me.Am.Ac. 6:401). Low herb; fls. white, V. Eastern and central China; locally in Hun., Ki., Ku. Roadside.

4. **Lysimachia** Linn. 珍珠菜属 (Chên Chu Ts'ai Shu)

Lfy.-stemmed perennial herbs; the entire *lvs. all of one form* and often glandular-dotted: fls. variously arranged, 5-6-merous; stamens often more or less united at the base: capsule 5-valved. 100 species, in temperate and tropical regions; 60 in China. (In honor of Lysimachus, a Greek General and King of Thrace, before 281 B.C.)

Key to the Species

a. Fls. white; corolla not glandular.
  b. Infl. usually a simple raceme terminating a lfy. br.
    c. Developing raceme pyramidal: lvs. (at least some of the lower ones) spatulate, 2-5 cm. long ..... 1. *L. candida*
    cc. Developing racemes scorpioid (curved) or cylindric: lvs. lanceolate to obovate, 5-15 cm. long.
      Plant pubescent: lvs. linear to oblong: infl. often curved when young ..... 2. *L. barystachys*
      Plant glabrous.
        Lvs. lanceolate: infl. slender-cylindric ..... 3. *L. fortunei*

Lvs. broadly lanceolate to obovate: infl. densely curved-cylindric when young ..... 4. *L. clethroides*

bb. Infl. usually conspicuously branched.

Lvs. and calyx not black-punctate; calyx lobes rounded-ovate ..... 3. *L. fortunei*

Lvs. and calyces conspicuously black-punctate.

Calyx lobes lanceolate-acuminate; brs. of the infl. spreading: stem lvs. lanceolate, auriculate ..... 5. *L. heterogenea*

Calyx lobes ovate-oblong, rounded at tip; brs. of infl. erect: stem lvs. spatulate ..... 6. *L. mauritiana*

aa. Fls. yellow; corolla often streaked with linear glands: lvs. ovate or lanceolate, and pubescent.

d. Lvs. alternate or opposite: fls. scattered and axilary or in small clusters.

e. Lvs. and petals striate with black linear glands.

Stems prostrate: lvs. all opposite: plant glabrous or nearly so ..... 7. *L. christinae*

Stems ascending: lvs. opposite below, alternate above: plant pilose with jointed hairs ..... 8. *L. grammica*

ee. Lvs. and petals not striate-glandular.

f. Petals glandular-dotted.

Stems ascending: lvs. larger near the tip and smaller near the base ..... 9. *L. congestiflora*

Stems prostrate; flagelliform towards the tip: lvs. larger towards the base: fls. single in the lf. axils ..... 10. *L. hemsleyana*

ff. Petals not glandular dotted.

Lvs. petiolate; blades rotund-ovate or ovate-acute: flg. pedicels to 1.5 cm. long ..... 11. *L. japonica*

Lvs. sessile, lanceolate, amplexicaul or connate: flg. pedicels to 3 cm. long ..... 12. *L. opherlioides*

dd. Lvs. verticillate: fls. in lfy. terminal clusters ..... 13. *L. klattiana*

1. **Lysimachia candida** Lindl. (*L. obovata* Ham.) 白珍珠菜 (Pai Chên Chu Ts'ai; White-pearl Herb) (H.F. 3:502; F.H.E. 2:48). Erect herb, to 4 dm.; fls. white, IV–V; fr. VI–VII. Eastern Asia; locally in An., Che., Hon., Hup., Ki., Ku. Moist ground.
2. **Lysimachia barystachys** Bunge (DC.P. 8:61). Erect herb, 3–5 dm. high; fls. white, V–VII. Northeastern Asia; locally in An., Hup., Ku. Grassland.
3. **Lysimachia fortunei** Maxim. 星宿菜 (Hsiang Hsü Ts'ai; Zodiac Plant) (B.M.Ed. 1.585). Erect herb, to 0.5 m.; fls. white, VII–VIII; fr. IX. China; locally in An., Che., Hun., Ki., Ku. Moist meadows.
4. **Lysimachia clethroides** Duby 珍珠菜 (Chên Chu Ts'ai; Pearl Herb) (B.M. 784). Erect herb, to 1 m.; fls. white, VI–VII; fr. VIII–IX. China, Japan; locally in An., Che., Hon., Hup., Ki., Ku. Grassland. Fig. 288.
5. **Lysimachia heterogenea** Klatt (*L. paludicola* Hemsl.) (F.H.E. 2:54; Ed.N. 16:107). Erect herb to 0.5 m.; fls. white, VII. Central China; locally in An., Che., Ki., Ku. Moist ground.
6. **Lysimachia mauritiana** Lam. (*L. linearilobа* Hook. & Arn.) (DC.P. 8:61; Ph.J. 3(Bot.):425). Brg. herb, 10–40 cm. high; fls. white. Eastern China, Korea, Japan, Indonesia; locally in Ki. Moist places.
7. **Lysimachia christinae** Hance (E.P.IV. 237:259). Prostrate herb; fls. yellow, VI.

China; locally in Che., Hup., Ku. Grassland.

8. **Lysimachia grammica** Hance 過路黃 (Kuo Lu Huang; Roadside Yellow) (E.P.IV. 237:263). Weak herb; fls. yellow, V–VI. China; locally in An., Hup., Ki., Ku. Moist ground.
9. **Lysimachia congestiflora** Hemsl. (F.H.E. 2:50). Perennial decumbent herb; fls. yellow, V. Central and western China; locally in Hun., Hup., Ki. Grassland.
10. **Lysimachia hemsleyana** Maxim. (H.I.t. 1890). Prostrate herb; fls. yellow, VI. Central and western China; locally in Che., Hup. Meadow.
11. **Lysimachia japonica** Thunb. (Mak.F. 232). Decumbent herb; fls. yellow, VI. Eastern Asia to Australia; locally in Hon., Hup., Ki., Ku. Grassland.
12. **Lysimachia ophelioides** Hemsl. (F.H.E. 2:54). Erect herb, 3–5 dm. high; fls. yellow, VI. Central and western China; locally in An., Ku. Brushland.
13. **Lysimachia klattiana** Hance (E.P.IV. 237:282). Erect herb, to 4 dm.; fls. yellow, V. China; locally in An., Che., Hup., Ki, Ku. Grassland.

138. PLUMBAGINACEAE Leadwort Family 磯松科 (Chi Sung K'o)

Herbs or low shrubs with alternate entire lvs. and perfect regular 5-merous fls.; *calyx scarious*, persistent, plicate, angled or winged, often colored at the base; corolla gamopetalous, sometimes the petals nearly distinct; *stamens 5, opposite the corolla lobes*; ovary superior, 1-celled; *styles or stigmas 5*: fr. a membranous circumscissile capsule. 10 genera with 300 species, mostly in Mediterranean region and central Eurasia; 3 genera with 10 species in China.

Key to the Genera

Stems lfy.: corolla with a long slender tube ..... 1. *Plumbago*
Stems usually naked: corolla segments joined only at the base ..... 2. *Limonium*

1. Plumbago Linn. Leadwort 千里及屬 (Ch'ien Li Chieh Shu)

Herbs or low shrubs with *lfy. stems*: lvs. auricled or clasping at the base: *fls. in spikes at the ends of the brs.*; calyx tubular, glandular, scarious only between the 5 ribs; *corolla with a long slender tube*; stamens free from the corolla: the deciduous part of the capsule often splitting into 5 valves. 10 species, in warm regions; 3 in China. (The Latin term for "lead".)

1. **Plumbago capensis** Thunb. (B.M. 786). Half-climbing sub-shrub; fls. azure blue or white, VI; calyx with stalked glands on upper part. Introduced from South Africa; locally in Ku. Planted, ornamental.

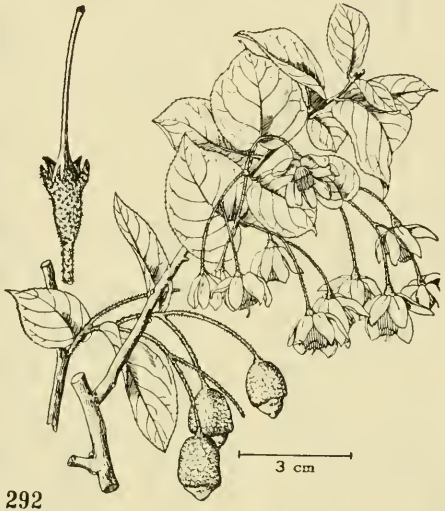
2. Limonium Mill. Sea Pink 磯松屬 (Chi Sung Shu)

Perennial herbs, usually with *naked stems* and evergreen lvs. in basal rosettes: *fls. in dense globular heads*, subtended by a scarious involucre; calyx scarious, 10-ribbed at the base; *petals united only at the base*; stamens on the base of the corolla: fr. enclosed in the calyx. 50 species, north temperate and southern regions, mostly South America; 6 in China. (Greek: *leimonion*, sea lavender; from *leimon*, meadow.)

1. **Limonium bicolor** (Bunge) Kuntze (*Statice bicolor* Bunge) 二色磯松 (Êrh Sê Chi Sung; Two-colored Rock Pine) (DC.P. 12:642). Erect perennial herb, to 0.5 m., fls. white, VIII. Northern China; locally in Ku. Grassland. Fig. 289.

139. EBENACEAE Ebony Family 柿科 (Shih K'o)

Dioecious or polygamous trees or shrubs with very hard wood and alternate entire



289. Limonium bicolor
290. Diospyros lotus

291. Styrax philadelphoides
292. Sinojackia xylocarpa

293. Fraxinus chinensis
294. Forsythia viridissima

estipulate usually coriaceous lvs.: *fls. regular*, axillary, 3–7-merous, on jointed 2-bracteate pedicels; calyx persistent, often enlarged in fr.; corolla gamopetalous, deciduous, usually pubescent on the outside; *stamens free* 2–3× the corolla lobes and *inserted on the corolla* tube; *ovary superior*, 2–16-celled; *styles 2–8*: fr. a several-seeded berry. 5 genera with 325 species, chiefly tropical; one genus and 30 species in China.

1. **Diospyros** Linn. Persimmon 柿属 (Shih Shu)

Fls. mostly 3-merous: *ovary 4–5-* (or 8–10) *celled*; cells 1- (or 2-) ovuled; styles 1–4: fr. globose, ellipsoid or oblong-conic, often with an enlarged calyx. 150 species, tropical regions, 13 in China. (Greek: *Dios*, of Jove, and *pyros*, grain; in allusion to the edible fruit.)

Key to the Species

a. Frtg. calyx with a flat or saucer-shaped portion at base: lobes usually rounded or obtuse.
  b. Frtg. calyx with shallow triangular lobes.
    Petioles 15–25 mm. long; lf. blades ovate, 7–15 cm. long, glaucescent and finely reticulate beneath ..... 1. *D. glaucifolia*
    Petioles 5–10 mm. long; lf. blades oblong or ovate, 5–10 cm. long, drying brownish and not reticulate..... 2. *D. morrisiana*
  bb. Frtg. calyx with rather deep broad lobes.
    Young brts. brownish pubescent: fr. 4–8 cm. across: fls. 15–18 mm. long ..... 3. *D. kaki*
    Young brts. glabrous: fr. about 1.5 cm. across: fls. about 5 mm. long ..... 4. *D. lotus*
aa. Frtg. calyx cleft to the base; segments ovate, oblong or lanceolate, 12–20 mm. long: lf. blades 4–8 cm. long.
  Lf. blades rhombic-ovate: frtg. pedicels 15–20 mm. long; segments of frtg. calyx lanceolate ..... 5. *D. rhombifolia*
  Lf. blades oblong-lanceolate: frtg. pedicels about 30 mm. long; segments of the frtg. calyx ovate ..... 6. *D. cathayensis*

1. **Diospyros glaucifolia** Metcalf (L.S.J. 14:669). Tree, to 15 m.; fls. VI–VII; fr. IX–X. East-central China; locally in An., Che., Ki. Woodland.
2. **Diospyros morrisiana** Hance (L.S.J. 14:670). Tree, to 10 m.; fr. yellow, IX. South China; locally in Che., Ki. Woodland.
3. **Diospyros kaki** Linn. f. Kaki Persimmon 柿 (Shih) (R.M. 759). Tree, to 15 m.; fls. yellowish white, V–VI; fr. orange to yellow, VIII–XI. China, Japan; locally in An., Ku. Cultivated, fruit.
4. **Diospyros lotus** Linn. Date Plum 君遷子 (Chün Ch'ien Tzŭ) (R.M. 759). Tree, to 12 m.; fls. reddish or greenish, VI; fr. yellow, sometimes becoming blue-black, X–XI. China and Japan to western Asia; locally in An., Ki., Ku. Cultivated, grafting stock. Fig. 290.
5. **Diospyros rhombifolia** Hemsl. 山柿 (Shan Shih; Mountain Persimmon) (F.H.E. 2:70). Tree, to 7 m.; fls. greenish, V; fr. orange red, X. Eastern China; locally in An., Che., Ki., Ku. Woodland.
6. **Diospyros cathayensis** Steward (*D. sinensis* Hemsl. non Blume ex Naudin.) (R.M. 759, AA.J. 35:86). Shrub or tree, to 8 m.; fls. V; fr. yellow, IX. Central, western and southern China; locally in Che., Hup., Ki. Woodland.

140. **SYMPLOCACEAE** Sweetleaf Family 灰木科 (Hui Mu K'o)

Shrubs or small trees with alternate simple estipulate lvs.: infl. axillary; fls. perfect, or sometimes unisexual, regular; *calyx membranous*, 5- (or 4-) lobed; corolla 5-10- (or 4-) lobed; *stamens* 15 to many (or 4-10), *fascicled, a cluster opposite each lobe of the corolla* and attached to its base; ovary more or less inferior; style one: *fr. obliquely attached, drupe-like.* Contains only the following genus.

1. **Symplocos** Jacq. Sweetleaf 灰木属 (Hui Mu Shu; Gray Wood Genus)

Characters of the family. 300 species, of tropical and subtropical Asia and America; 50 in China. (Greek: *symplokos*, connected; referring to the united stamens.)

Key to the Species

a. Lvs. membranous, deciduous.
  Lvs. pubescent on both sides: calyx lobes acute, villose: fr. hairy ..... 1. *S. chinensis*
  Lvs. glabrous above, usually pubescent beneath: calyx lobes rounded, not villose, but ciliate along the margins: fr. glabrous ..... 2. *S. paniculata*
aa. Lvs. coriaceous, evergreen.
  b. Fls. in axillary racemes.
    c. Calyx lobes glabrescent or ciliate, not canescent.
      Fr. oblong or urceolate, 8-10 mm. long.
        Brts. of the season ferrugineous-tomentose: fr. oblong, about 8 mm. long ..... 3. *S. anomala*
        Brts. of the season glabrous: fr. urceolate, about 10 mm. long ..... 4. *S. caudata*
      Fr. globose or ovoid, about 4 mm. long: brts. pilose ..... 5. *S. lancifolia*
    cc. Calyx short-canescent-sericeous: corolla lobes connate to the middle: brts. of the season scabrous: lvs. lanceolate-oblong, 5-10 cm. long: fr. canescent, urceolate, 6-7 m. long ..... 6. *S. confusa*
  bb. Fls. in sessile fascices.
    Brts. glabrous, densely and minutely crystalline-granular (under magnification): calyx of fr. cleft to base; lobes gray-pilose on back, 2× (or more) as long as broad: lvs. oblong ..... 7. *S. setchuensis*
    Brts. ferrugineous-tomentose: calyx of fr. cleft 1/2-2/3; lobes glabrous on back, as broad as long: lvs. linear to lanceolate. 8. *S. stellaris*

1. **Symplocos chinensis** (Lour.) Druce (*S. sinica* Ker) 華白檀 (Hua Pai T'an; Chinese White Dalbergia) (R.M. 760). Shrub or small tree; fls. white, V; fr. black, pubescent, X. Eastern and central China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
2. **Symplocos paniculata** (Thunb.) Miq. (*S. crataegoides* Buch.-Ham. ex D. Don). Asiatic Sweetleaf 白檀 (Pai T'an; White Delbergia) (R.M. 760). Shrub or tree, to 12 m.; fls. white, IV-V; fr. blue-black, glabrous, IX-X. Eastern Asia; locally in An., Che., Hon., Hup., Ki., Ku. Woodland.
3. **Symplocos anomala** Brand (*S. alata* Brand) (E.P.IV. 242:67). Shrub or tree, to 15 m.; fls. creamy-white, IX; fr. brownish-black, VII. Central and southern China; locally in An., Che., Hun., Hup., Ku. Forest.
4. **Symplocos caudata** Wall. ex G. Don 山礬 (Shan Fan; Mountain Tannin) (H.F. 3:577). Shrub or tree, to 12 m.; fls. greenish white, IV; fr. VIII. Eastern Asia; locally in An., Che., Hun., Hup., Ki. Forest.

5. **Symplocos lancifolia** Sieb. & Zucc. (Mak.F. 226). Shrub or tree, to 8 m.; fls. white, V; fr. black, X. Japan, China; locally in Che., Hun., Hup., Ki. Forest.
6. **Symplocos confusa** Brand (E.P.IV. 242:88). Shrub or tree, to 10 m.; fls. white, VII; fr. X. Southeastern Asia, Malaya; locally in Che., Ki. Forest.
7. **Symplocos setchuensis** Brand (E.P.IV. 242:31). Shrub or tree, to 10 m.; fls. cream-white, III; fr. black, IX. Central and western China; locally in An., Che., Hun., Ki., Ku. Forest.
8. **Symplocos stellaris** Brand 老鼠矢 (Lao Shu Shih) (E.P.IV. 242:68). Shrub or tree, to 10 m.; fls. cream-white, V; fr. IX. Central and southern China; locally in An., Che., Ki., Ku. Forest.

141. **STYRACACEAE** Storax Family 野茉莉科 (Yeh Mo Li K'o)

Shrubs or trees with *watery sap*, *alternate* simple estipulate *lvs.* and usually with stellate pubescence: fls. perfect and regular; calyx 4–5-cleft; corolla 4–8-lobed nearly to the base; stamens 2× the corolla lobes; ovary superior or inferior, 3–5-celled below, often one-celled above: *fr. dry or drupaceous.* 8 genera with 120 species, in the northern hemisphere and South America; 6 genera and 36 species in China.

Key to the Genera

A. Ovary superior or partly so.
  Fr. ovoid to globose, with 1-2 large seeds ..... 1. *Styrax*
  Fr. narrowly oblong and somewhat lobed, with numerous winged seeds ..... 2. *Alniphyllum*
AA. Ovary inferior or nearly so.
  Fr. strongly fluted and densely pubescent; calyx teeth sometimes persistent ..... 3. *Pterostyrax*
  Fr. smooth, or faintly ribbed. not fluted; calyx teeth deciduous.
    Fr. faintly ribbed, pubescent when young, about 5 cm. long; surface not waxy ..... 4. *Melliodendron*
    Fr. smooth, glabrous, 2.0-2.5 cm. long; surface waxy ..... 5. *Sinojackia*

1. **Styrax** Linn. Storax 野茉莉屬 (Yeh Mo Li Shu; Wild Jasmine Genus)

Trees or shrubs with white fls. in axillary or terminal racemes; stamens 10–16; *ovary superior*, or only slightly inferior, 3-celled below, one-celled above: *fr.* a dry or fleshy, *ovoid or globose*, *not lobed*, irregularly dehiscent drupe, *with 1–2 large seeds.* Nearly 100 species, in tropical and warm temperate regions of America and Eurasia; 25 in China. (The old Greek name of *Styrax officinalis.*)

Key to the Species

a. Lvs. densely white- or gray-stellate-tomentose beneath.
  Petioles 1-3 mm. long; leaf blades oblong or obovate-oblong: axes of racemes tomentose.
    Racemes few-fld.; fls. 1.5-2.0 cm. long ..... 1. *S. calvescens*
    Racemes many-fld.; fls. 1 cm. long ..... 3a. *S. dasyanthus* var. *cinerascens*
  Petioles 10-15 mm. long, sheath-like at the base and surrounding the bud; lf. blades sub-orbicular to broad-ovate or elliptic: racemens many-fld.; axes of the racemes glabrous ..... 2. *S. obassia*
aa. Lvs. glabrous or pubescent, not tomentose.

b. Petioles 1-3 mm. long.
Lvs. coriaceous: veins prominent.
Racemes many-fld.; fls. small, about 1 cm. long: lvs. usually 7-14 cm. long ..... 3. *S. dasyanthus*
Racemes few-fld.; fls. larger, 1.5-2.0 cm. long ..... 4. *S. philadelphoides*
Lvs. membranous; veins not very prominent: racemes few-fld.; fls. 1.5-2.0 cm. long ..... 5. *S. faberi*
bb. Petioles 3-10 mm. long: racemes few-fld.
Flg. and frtg. pedicels 15-25 mm. long, glabrous; calyx glabrous ..... 6. *S. japonica*
Flg. and frtg. pedicels. 2-5 mm. long, tomentose; calyx tomentose ..... 7. *S. suberifolius*

1. **Styrax calvescens** Perk. (E.P.IV. 241:32). Shrub or tree, to 5 m.; fls. white, IV; fr. VIII-IX. Central China; locally in Che., Hup., Ki. Woodland.
2. **Styrax obassia** Sieb. & Zucc. (R.M. 762). Shrub or tree, to 15 m.; fls. white, IV; fr. VIII-IX. Japan, Korea, eastern China; locally in An., Che. Forest.
3. **Styrax dasyanthus** Perk. 垂珠花 (Ch'ui Chu Hua; Drooping-pearl Flower) (R.M. 762) Shrub or tree, to 8 m.; fls. white, V-VI; fr. VIII-IX. Central China; locally in An., Che., Hup., Ki., Ku. Woodland.

3a. **Styrax dasyanthus** var. **cinerascens** Perk. (Pl.W. 1: 289). China; locally in Che., Hun., Hup., Ki.

4. **Styrax philadelphoides** Perk. Mountain Cherry Storax (E.P.IV. 241: 32). Shrub or tree, to 6 m; fls. white, V; fr. VIII. Eastern and central China; locally in An., Che., Hup., Ki., Ku. Woodland. Fig. 291.
5. **Styrax faberi** Perk. (E.P.IV. 241: 33). Shrub, to 3 m.; fls. white, V; fr. VIII. Eastern and central China; locally in An., Che., Hun., Ki., Ku. Woodland.
6. **Styrax japonica** Sieb. & Zucc. (R.M. 761). Shrub or tree, to 10 m.; fls. white, V; fr. VIII. Japan, China; locally in An., Hon., Hun., Hup. Ki. Woodland.
7. **Styrax suberifolius** Hook. & Arn. (Be.F. 213). Tree, to 20 m.; fls. white, VI; fr. VIII-IX. Southeastern Asia; locally in An., Che., Hup. Ki. Forest.

The characters used in the key to species, e.g. leaf-texture and leaf-size, as well as number and size of flowers, have proven so variable that results were not very satisfactory. There seem to be in *S. faberi* and *S. philadelphoides* elements requiring further separation.

2. **Alniphyllum** Mats. 擬赤楊属 (I Ch'ih Yang Shu)

Shrubs or trees with red or white 5-merous fls. in axillary or terminal racemes; stamens 10, monadelphous; *ovary* 5-celled, more or less *superior*; *fr.* a *narrowly oblong lobed* woody capsule with *numerous winged seeds*. 3 species, in eastern Asia; 2 in China. (Latin: *Alni*; Alnus: and *phyllum*, leaf; indicating that the leaves resemble those of *Alnus*.)

1. **Alniphyllum fortunei** (Hemsl.) Perk. 擬赤楊 (I Ch'ih Yang; Resembling-red Poplar) (Lee 913). Tree, to 25 m.; fls. white or tinged purple, V; fr. VIII. China; locally in An., Che., Ki, Ku., Forest.

3. **Pterostyrax** Sieb. & Zucc. 白辛樹属 (Pai Hsing Shu Shu)

Deciduous trees or shrubs with fragrant 5-merous fls. in large panicles which terminate short lateral brts.; *calyx teeth persistent*; stamens 10, exserted; filaments more or less united; *ovary* 3- (or 4-5-) celled, *inferior* or nearly so: *fr.* a dry *fluted*

and *densely pubescent* drupe. 5 species, in eastern Asia, all occurring in China. (Greek: *pteron*, wing; and *styrax*, referring to the winged fruit.)

1. **Pterostyrax corymbosa** Sieb. & Zucc. 小葉白辛樹 (Hsiao Yeh Pai Hsing Shu; Small-leaved White-bitter Tree) (R.M. 765). Tree, to 15 m.; fls. white, V; fr. fluted, IX. Japan, China; locally in An., Che., Ki., Ku., Hun. Forest.

4. **Melliodendron** Hand.-Mazz. 樓木屬 (Mê Mu Shu)

Deciduous tree with alternate simple finely serrate lvs.: fls. pedicellate, one or two from a single axillary bud, appearing before the lvs.; stamens 10, in a single series, joined at the base into a short tube, shorter than the corolla; ovary 2/3 inferior: *fr.* woody, one-seeded, obovoid, *pubescent when young, faintly ribbed*, but not fluted, obtuse and apiculate, about 5 *cm. long*. One species, in southern and central China. (Named for Rudolf Mell, an Austrian middle school director who collected the type material in Kwantung Province in 1917.)

1. **Melliodendron xylocarpum** Hand.-Mazz. (I.P.S. 4: 47). Tree, to 20 m.; fls. white, IV; fr. IX–X. Southern and central China; locally in Hun., Ki. Along streams.

5. **Sinojackia** Hu 秤錘樹屬 (Ch'êng Chui Shu Shu)

Small deciduous trees with white 5- (6–7-) merous fls. in axillary cymes; *calyx teeth deciduous*; stamens 10 (or 12–24), inserted on the base of the corolla; *ovary inferior*, 3–4-celled: *fr.* a woody indehiscent *glabrous* oblong one-seeded drupe, irregularly transversely fissured, but *not ribbed or fluted*. 2 species, in China. (After J. G. Jack of the Arnold Arboretum; the prefix in reference to his connection with Chinese botany.)

Key to the Species

Fr. cylindric-oblong, 2.5 cm. long	1.	*S. rehderianae*
Fr. ovoid, about 2 cm. long, with conical apex	2.	*S. xylocarpa*

1. **Sinojackia rehderiana** Hu (R.M. 764). Tree, to 5 m.; fls. white, IV; fr. IX–X. Central China; locally in Ki. Woodland.
2. **Sinojackia xylocarpa** Hu 秤錘樹 (Ch'êng Chui Shu; Steelyard-weight Tree) (R.M. 764). Tree, to 7 m.; fls. white, IV; fr. VIII–IX. East-central China; locally in Ku. Woodland. Fig. 292.

142. **OLEACEAE** Olive Family 木樨科 (Mu Hsi K'o)

Trees or shrubs with usually *opposite lvs.* and regular mostly perfect 4-merous fls.; calyx or corolla or both sometimes wanting; *stamens* 2 (rarely 3–5), on the corolla and *alternate* with its lobes; ovary 2-celled, with usually 2 ovules in each cell: fr. a drupe, berry, capsule or samara. 22 genera with 500 species, in temperate and tropical regions; 10 genera and 115 species in China.

Key to the Genera

A. Fr. a samara, conspicuously winged.		
Fr. ellipsoid, winged all around: lvs. simple	1.	*Fontanesia*
Fr. elongated, often linear, winged mostly from the tip: lvs. pinnately compound	2.	*Fraxinus*

AA. Fr. not winged.
B. Fr. a capsule.
Fls. yellow: lvs. serrate ..... 3. *Forsythia*
Fls. lavender or white, never yellow: lvs. entire ..... 4. *Syringa*
BB. Fr. a drupe or berry.
C. Corolla lobes short: lvs. evergreen (sometimes deciduous in *Jasminum*).
Fls. in terminal panicles or spikes: lvs. simple. ..... 5. *Ligustrum*
Fls. axillary.
Lvs. simple: fls. numerous, very fragrant ..... 6. *Osmanthus*
Lvs. pinnately compound, sometimes reduced to 3 lfts.: fls. larger, scattered ..... 7. *Jasminum*
CC. Corolla lobes strap-shaped, linear: lvs. deciduous. ..... 8. *Chionanthus*

1. **Fontanesia** Labill. 雪柳属 (Hsüeh Liu Shu)

Deciduous shrubs with quadrangular brts. and *simple lvs.*: fls. in lly. terminal panicles; petals small and narrow, shorter than the stamens: *fr. an ellipsoid samara, winged all around.* 2 species, in Asia; one in China. (After Réné Louiche Desfontaines, 1752–1833, French botanist.)

1. **Fontanesia fortunei** Carr. 雪柳 (Hsüeh Liu: Snow Willow) (R.M. 766). Shrub, to 2 m.; fls. greenish white, V-VI; fr. VII–X. China; locally in An., Che., Ku. Woodland, planted, ornamental.

2. **Fraxinus** Linn. Ash 白臘樹属 (Pai La Shu Shu)

Deciduous trees or shrubs with mostly *pinnate lvs.* and small sometimes unisexual fls.; perianth sometimes wanting: *fr. a narrow samara*, winged from the top. 65 species, north temperate regions; 18 in China. (The old Latin name.)

1. **Fraxinus chinensis** Roxb. Chinese Ash 白臘樹 (Pai La Shu; White-wax Tree) (R.M. 769). Tree, 15 m.; fls. greenish, V; corolla wanting; fr. VIII–X. China; locally in An., Che., Hup., Ki., Ku. Woodland. Fig. 293.
1a. **Fraxinus chinensis** var. **acuminata** Lingelsh. (R.M. 769). Lfts. ovatevlanceolate to lanceolate, long-acuminate, sharply serrate, to 12 cm. long. China; locally in An., Che.
1b. **Fraxinus chinensis** var. **rhynchophylla** (Hance) Hemsl. (R.M. 769). Lfts. broad-ovate or obovate, 6–15 cm. long, acuminate, coarsely crenate-serrate or subentire. China; locally in Che., Hup., Ki., Ku.

3. **Forsythia** Vahl Golden Bell 金鐘花属 (Chin Chung Hua Shu)

Deciduous shrubs with *simple serrate lvs.* and axillary pedicelled campanulate heterostylous yellow fls. which appear before the lvs.; calyx persistent: *fr. a* 2-celled dehiscent *capsule* with many winged seeds. 6 species, in Eurasia; 3 in China. (After Wm. Forsyth, 1737–1800, English horticulturist.)

1. **Forsythia viridissima** Lindl. 金鐘花 (Chin Chung Hua; Golden-bell Flower) (R.M. 776). Shrub, to 3 m.; fls. yellow, IV–V; fr. VIII; lvs. serrate above the middle. China; locally in An., Che., Hun., Ki., Ku. Cliffs, planted, ornamental. Fig. 294.

4. **Syringa** Linn. Lilac 丁香属 (Ting Hsiang Shu)

Deciduous shrubs or small trees with simple *entire* (ours) *lvs.* and numerous *lavender or white* (*not yellow*) *fls.* in pyramidal panicles: *fr. a* loculicidal *capsule* with 2 winged seeds in each cell. 25 species, in Eurasia; 23 in China. (Greek: *syrinx*, a pipe or tube; referring to the stems of *Philadelphus*, to which the name was originally applied.)

1. **Syringa vulgaris** Linn. Common Lilac 洋丁香 (Yang Ting Hsiang; Foreign Fragrance) (R.M. 781). Shrub or tree, to 7 m.; fls. lilac or white, fragrant, IV–V; lvs. glabrous, ovate, entire. Introduced from southeastern Europe; locally in Ku. Planted, ornamental.

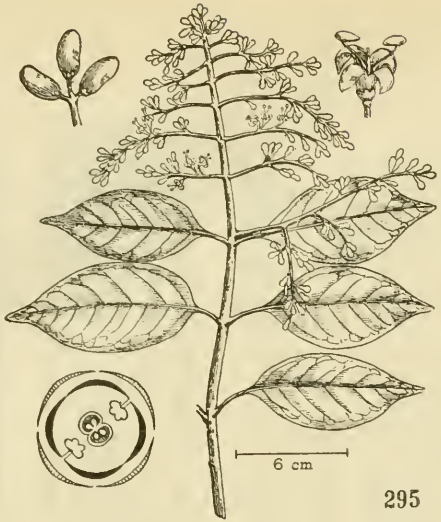
5. **Ligustrum** Linn. Privet 女貞属 (Nü Chên Shu)

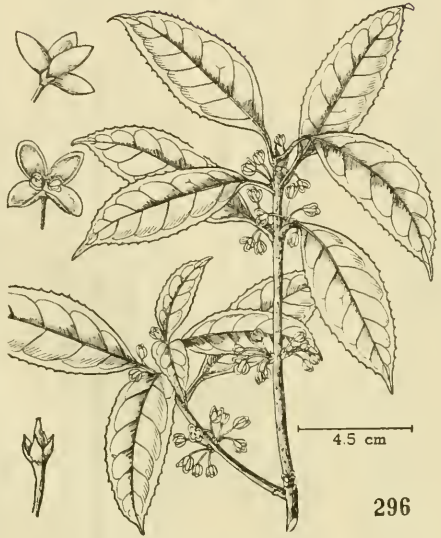
Lvs. entire: *fls.* small, *white*, numerous, in terminal panicles: *fr. a* berry-like *drupe*, 1–4-seeded. 50 species, from Eurasia to Australia and North Africa; 25 in China. (The old Latin name.)

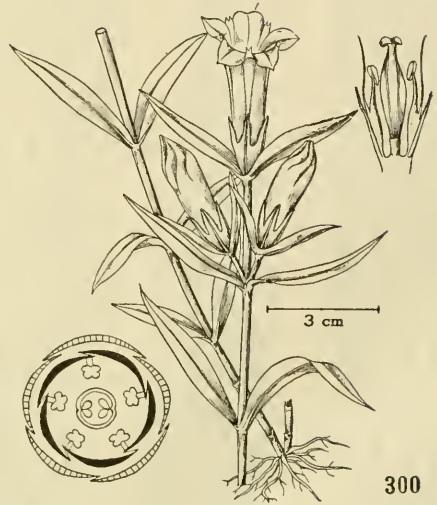
Key to the Species

a. Corolla-tube shorter than the lobes, or about the same length.
  b. Lvs. coriaceous, persistent: brts. and infl. glabrous.
    Lvs. 4–8 cm. long ..... 1. *L. japonicum*
    Lvs. 6–12 cm. long ..... 2. *L. lucidum*
  bb. Lvs. membranous or sub-coriaceous, deciduous or half-evergreen: brts. and infl. pubescent.
    Fls. pedicelled, in large loose panicles.
      Brts. minutely puberulous: lvs. glabrous: stamens not exceeding the corolla lobes: fr. oblong, 7–9 mm. long, curved ..... 3. *L. compactum* var. *latifolium*
      Brts. densely pubescent: lvs. pubescent on midrib beneath: stamens longer than the corolla lobes: fr. subglobose, 3 mm. long. ..... 4. *L. sinense*
    Fls. sessile, in narrow spikes forming panicles..... 5. *L. quihoui*
aa. Corolla tube 2–3× the lobes; panicles narrow, nearly cylindrical, 2–5 cm. long.
    Brts. and lvs. glabrous: lvs. half-evergreen, elliptic-ovate to elliptic-oblong ..... 6. *L. ovalifolium*
    Brts. pubescent: lvs. usually hairy on the midrib beneath, elliptic to oblong to lanceolate.
      Calyx glabrous: pedicels glabrous or sparsely pubescent .... 7. *L. acutissimum*
      Calyx and pedicels finely pubescent ..... 8. *L. obtusifolium*

1. **Ligustrum japonicum** Thunb. (R.M. 785). Shrub, to 5 m.; fls. white, fragrant, VI; fr. black, X. Japan, Korea, China; locally in Che., Hup., Ki. Woodland.
2. **Ligustrum lucidum** Ait. f. Glossy Privet 女貞 (Nü Chên; Woman's Chastity) (R.M. 785). Shrub or tree, to 10 m.; fls. white, VIII–IX; fr. blue-black, IX–X. China, Japan, Korea; locally in An., Che., Hun., Hup., Ki., Ku. Planted, ornamental. Fig. 295.
3. **Ligustrum compactum** Hook. f. & Thoms. var. **latifolium** Cheng (R.M. 784; Sc. C. 10: 44). Shrub or tree, to 10 m.; fls. white, VI–VII; fr. blue-black, X. China; locally in Ku. Planted, ornamental.







295. Ligustrum lucidum
296. Osmanthus fragrans

297. Jasminum nudiflorum
298. Buddleia officinalis

299. Crawfurdia fasciculata
300. Gentiana scabra

4. **Ligustrum sinense** Lour. Chinese Privet 小蠟 (Hsiao La; Small Fraxinus) (R.M. 784). Shrub, to 4 m.; fls. white, VII; fr. IX–X. China; locally in An., Che., Hun. Hup., Ki., Ku. Woodland.
5. **Ligustrum quihoui** Carr. 小葉女貞 (Hsiao Yeh Nü Chên; Small-leaved Privet) (R. M. 785). Shrub, to 2 m.; fls. white, VI–VIII; fr. X–XI. China; locally in An., Che., Hup., Ku. Woodland.
6. **Ligustrum ovalifolium** Hassk. (R.M. 786). Shrub, to 5 m.; fls. cream-white, VI; fr. black, IX. Japan, China; locally in Che., Ki. Thickets.
7. **Ligustrum acutissimum** Koehne 蠟子樹 (La Tzŭ Shu; Wax Tree) (R.M. 787). Shrub, to 3 m.; fls. white, VI; fr. blue-black, IX–X. Central China; locally in An., Che., Hun. Hup., Ki., Ku. Forest.
8. **Ligustrum obtusifolium** Sieb. & Zucc. (R.M. 787). Shrub, to 3 m.; fls. white, fragrant, VI; fr. black, IX. Japan, Korea, China; locally in Ku. Thickets.

6. **Osmanthus** Lour. 木樨属 (Mu Hsi Shu)

Evergreen shrubs or small trees, sometimes polygamous or dioecious, with *simple lvs.* and small *numerous fragrant fls.*: *fr. an* ovoid *drupe*. 10 species, eastern and southern Asia, Polynesia and North America; 8 in China. (Greek: *osme*, fragrance; and *anthos*, flower, referring to the fls. of *O. fragrans*.)

1. **Osmanthus fragrans** Lour. 桂花 (Kuei Hua) (B.M. 795). Shrub or tree, to 10 m.; fls. yellow or white, very fragrant, X; corolla deeply cleft. Eastern Asia; locally in An., Hun., Hup., Ki., Ku. Planted, ornamental. Fig. 296.

7. **Jasminum** Linn. Jasmine 茉莉花属 (Mo Li Hua Shu)

Climbing or erect shrubs with sometimes alternate usually *pinnate or 3-foliolate lvs.* and *large scattered* yellow or white *fls.*; *fr. a* 2-lobed *berry*. 200 species, tropical and subtropical regions; 27 in China. (From the Arabic name.)

Key to the Species

a. Fls. yellow.
  Lvs. alternate: fls. many, in terminal cymes .... 1. *J. floridum*
  Lvs. opposite: fls. lateral, solitary ..... 2. *J. nudiflorum*
aa. Fls. white, often tinged with purple: lvs. opposite.
  Lvs. 3-foliolate; lfts. 3–6 × 4–10 cm..... 3. *J. lanceolarium* var. *puberulum*
  Lvs. 5–7-foliolate; lfts. 0.5–1.0 × 1–2 cm ..... 4. *J. officinale* var. *grandiflorum*

1. **Jasminum floridum** Bunge 探春花 (T'an Ch'un Hua; Searching-for-spring Flower) (R.M. 792). Half-evergreen shrub, to 3 m.; fls. yellow, VII–IX. China; locally in An., Ku. Planted, ornamental.
2. **Jasminum nudiflorum** Lindl. Winter Jasmine 迎春花 (Ying Ch'un Hua; Welcoming-spring Flower) (R.M. 791). Deciduous shrub, to 5 m.; fls. yellow, II–IV. China; locally in An., Ku. Planted, ornamental. Fig. 297.
3. **Jasminum lanceolarium** Roxb. var. **puberulum** Hemsl. (H.F. 3: 601; F.H.E. 2:78). Woody climber; fls. white, VI–VIII; fr. brown, X–XI. China; locally in An., Che., Hun. Hup., Ki. Forest.
4. **Jasminum officinale** Linn. var. **grandiflorum** (L.) Kobuski Spanish Jasmine 素馨花 (Su Hsing Hua; Pure-fragrance Flower) (R.M. 792). Deciduous shrub; fls. white, often tinged purple. India to China; locally in Ku. Planted, ornamental.

8. **Chionanthus** Linn. Fringe Tree 流蘇樹属 (Liu Su Shu Shu)

Dioecious deciduous trees or shrubs with *simple entire lvs.* and conspicuous white fls. in loose panicles; *corolla lobes strap-shaped*, linear: *fr. an* oval dark blue *drupe*, 1-seeded. 2 species, one in eastern North America and one in China. (Greek: *chion*, snow; and *anthos*, flower; referring to the abundant white flowers.)

1. **Chionanthus retusa** Lindl. 流蘇樹 (Liu Su Shu; Tassel Tree) (R.M. 791). Shrub or tree, to 6 m.; fls. white, VI–VII; fr. dark blue, IX–X; lvs. 4–10 cm. long. Eastern Asia; locally in An., Che., Ku. Forest, planted, ornamental.

143. **LOGANIACEAE** Strychnine Family 馬錢科 (Ma Ch'ien K'o)

Herbs, shrubs or trees with *opposite simple stipulate lvs.* and perfect regular usually 4–5-*merous fls.*; stamens as many as the corolla lobes and alternate with them; ovary superior, 2-celled: fr. a capsule, berry or drupe. 32 genera with 800 species, tropical and subtropical regions. 6 genera and 26 species in China.

Key to the Genera

Erect shrubs, with stellate glandular or scaly pubescence: fr. a 2-valved capsule with many seeds ..... 1. *Buddleia*
Scandent shrubs, glabrous: fr. a 2-seeded berry ..... 2. *Gardneria*

1. **Buddleia** Linno. Butterfly Bush 醉魚草属 (Tsui Yü Ts'ao Shu)

Erect plants *with* stellate, glandular or scaly *pubescence* and *numerous clustered* 4-*merous fls.*: fr. a 2-valved *capsule* with *numerous* very small *seeds*. 70 species, tropical and temperate regions; America, Asia and southern Africa; 17 in China. (After Adam Buddle, an English botanist, who died in 1715.)

Key to the Species

Lvs. serrate, tomentose beneath: brs. terete or obscurely angled: calyx and corolla pubescent outside; corolla straight, orange at the mouth ..... 1. *B. davidii*
Lvs. entire, glabrous or nearly so: brs. conspicuously angled: calyx and corolla finely glandular outside; corolla curved, not marked with orange at the throat ..... 2. *B. lindleyana*

1. **Buddleia davidii** Franch. Orange-eye Butterfly-bush 大葉醉魚草 (Ta Yeh Tsui Yü Ts'ao) (R.M. 795). Shrub, to 5 m.; fls. lilac and orange, VII–X. China; locally in Ku. Planted, ornamental.
2. **Buddleia lindleyana** Fortune 醉魚草 (Tsui Yü Ts'ao; Fish-intoxicated Herb) (R.M. 794). Shrub, to 2 m.; fls. purplish violet, VI–IX. Eastern China; locally in An., Ki., Ku., Che. Woodland, planted, ornamental.

Buddleia officinalis Maxim. is found in the Ichang Gorge, Hupeh and in Shensi, Kansu and Szechuan. Fig. 298.

2. **Gardneria** Wall. 蓬萊葛属 (P'êng Lai Ko Shu)

Scandent shrubs, *glabrous*, with opposite petiolate entire evergreen lvs.: fls. axillary, solitary or in pedunculate clusters; calyx small, 4–5-lobed; corolla-lobes 4–5, thick, valvate in bud; stamens 4–5, on the corolla tube; anthers subsessile; ovary 2-

celled, 2-ovuled, becoming a 2-*seeded berry*. 5 species, from India to Japan; 4 in China. (Named for George Gardner, a Scottish physician and botanist, about 1812–1849.)

1. **Gardneria multiflora** Mak. (Bo.Ma.T. 15: 103). Climbing shrub; fls. yellow, several on axillary peduncles, VI–VIII; fr. red, X–XI. Japan and China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.

144. GENTIANACEAE Gentian Family 龍胆科 (Lung Tan K'o)

Smooth *herbs* with usually opposite simple entire sessile estipulate lvs. and perfect regular 4–5-merous fls. in axillary or terminal cymes: corolla often twisted in the bud: *ovary superior, one-celled*: *fr. a 2-valved capsule*. 70 genera with 800 species, cosmopolitan, especially in temperate regions; 8 genera and 150 species in China.

Key to the Genera

Lvs. opposite: plants terrestrial.
- Twining herbs ..... 1. *Crawfurdia*
- Erect herbs ..... 2. *Gentiana*

Lvs. alternate: plants aquatic ..... 3. *Nymphoides*

1. Crawfurdia Wall. 蔓龍胆属 (Wan Lung Tan Shu)

Twining herbs with *opposite* 3-*nerved lvs.* and showy axillary usually 5-merous purple-white or greenish yellow fls.; calyx tubular; corolla tubular-campanulate, often plicate; *stamens on the middle of the corolla tube*: fr. sometimes indehiscent; seeds many, winged. 10 species, in eastern Asia; 5 in China.

1. **Crawfurdia fasciculata** Wall. 蔓龍胆草 (Wan Lung Tan Ts'ao; Creeping Gentian) (H.F. 4: 107). Twining herb; fls. pink or purple, VIII–X. Eastern Asia; locally in An., Che., Hup., Ki. Brushland, woodland. Fig. 299.

2. Gentiana Linn. Gentian 龍胆属 (Lung Tan Shu)

Erect terrestrial herbs with *opposite* often connate *lvs.* and showy often solitary fls.; *corolla* tubular, usually with intermediate *plaited* folds between the lobes bearing appendages or teeth at the sinuses: capsule separating into 2 carpels; seeds numerous. 180 species, widely distributed; 100 in China. (Gentia-na, named for Gentius, King of Illyria.)

Key to the Species

Plant 3–5 dm. tall: lvs. narrowly lanceolate or linear: fls. 4–5 cm. long .. 1. *G. scabra*

Plant not over one dm. high: lvs. broadly ovate or spathulate-rotund: fls. 2–3 cm. long ..... 2. *G. zollingeri*

1. **Gentiana scabra** Bunge 龍胆 (Lung Tan; Dragon's Gall) (DC.P. 9: 112). Erect herb, to 8 dm.; fls. blue. Transbaicalia, North China, Japan; locally in Ku. Grassland. Fig. 300.
2. **Gentiana yokusai** Burkill 筆龍胆 (Pi Lung Tan; Pencil Gentian) (A.S.B. 2: 316). Brg. herb, to 1 dm.; fls. 2–3 cm. long; anthers linear, free; fr. 6 mm. long. Northeastern Asia; locally in An., Ku. Mountain meadows.

3. Nymphoides Tourn. ex Medic. Floating Heart 荇菜属 (Hsing Ts'ai Shu)

Polygamous *aquatic* herbs with *alternate* floating usually cordate long-petiolate *lvs.*

and umbels of 5-merous yellow or white fls. on long slender stems (apparently the petioles); *corolla lobes fringed*, with glandular appendages at the base. 20 species, widely distributed in fresh water; 2 in China. *Limnanthemum* Gmel. (Nymphoi-des: nymphaea-like.)

1. **Nymphoides peltatum** (Gmel.) Kuntze (*Limnanthemum nymphoides* (L.) Hoffm. & Link) 荇菜 (Hsing Ts'ai) (G.M. 1166, G.M. 7 th 661). Herb, creeping on mud or floating; fls. yellow, V–X. Eurasia; locally in An., Ki., Ku. Ponds and lakes. Fig. 301.

145. APOCYNACEAE Dogbane Family 夾竹桃科 (Chia Chu T'ao K'o)

Herbs, shrubs or trees, often climbing, with latex, and usually with opposite or whorled entire estipulate lvs.: fls. perfect, regular, 5- (or 4-) merous; *corolla* usually *twisted in the bud*, often with appendages in the throat; *carpels* 2, *superior, distinct*: fr. a pair of follicles, rarely berry- or drupe-like; seeds usually compressed and hairy-tufted. 300 genera with 1,300 species, of tropical and subtropical regions; 20 genera and 30 species in China.

Key to the Genera

Plants erect.
- Anthers free from the stigma: lvs. ovate-oblong, obtuse: low plants, herbs or shrubby below ..... 1. *Catharanthus*
- Anthers joined to the stigma: lvs. linear-lanceolate, acute: shrubs or small trees ..... 2. *Nerium*

Decumbent or twining shrubs ..... 3. *Trachelospermum*

1. Catharanthus G. Don 長春花屬

(Ch'ang Ch'un Hua Shu; Forever-spring Flower Genus)

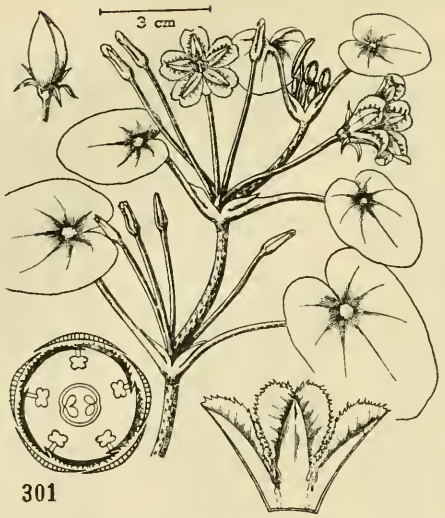
Low plants, *shrubby at the base*, with *ovate-oblong obtuse* opposite *lvs.* and axillary fls., solitary or in pairs; corolla salverform, with a slender tube; stamens included; *anthers free* from the stigma; disc composed of 2 large glands, alternating with the carpels; carpels distinct; but the styles united: follicles erect or spreading: seeds not appendaged. 3 species, in tropical America, India and Madagascar; one cultivated in China. (Greek: *katharos*, pure; and *anthos*, flower.)

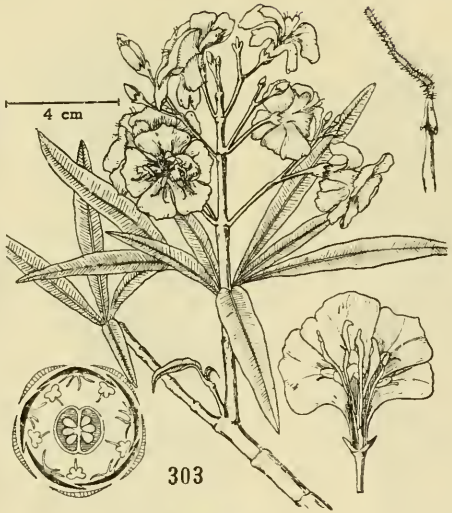
1. **Catharanthus roseus** (L.) G. Don (*Vinca rosea* Linn.; *Lochnera rosea* (L.) Reichb.) Madagascar Periwinkle 日日草 (Jih Jih Ts'ao; Daily-flowering Herb) (B.M. 812). Herb or subshrub, to 6 dm.; fls. rose-purple or white, IX. Tropical countries; locally in Ku. Planted, ornamental. Fig. 302.

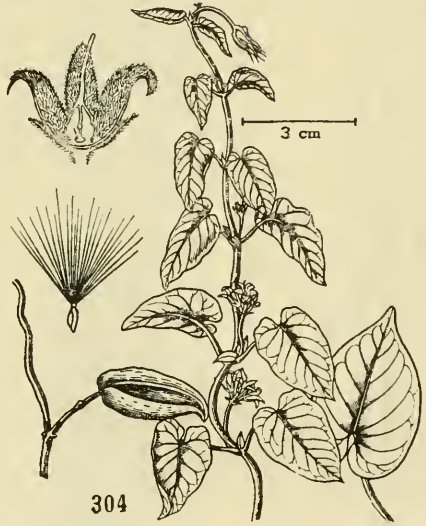
2. Nerium Linn. 夾竹桃屬 (Chia Chu T'ao Shu)

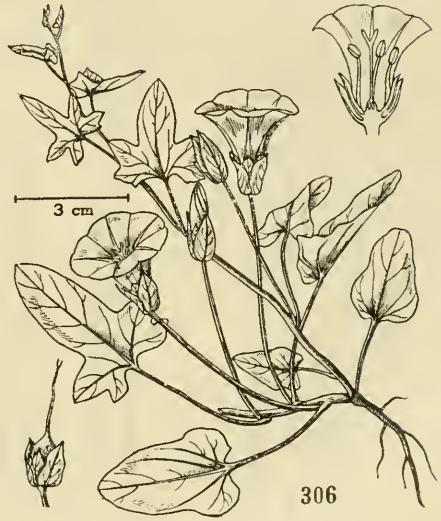
Upright shrubs or small trees with *linear-lanceolate acute* whorled or opposite *lvs.* and abundant large showy fls. in terminal cymes; corolla funnel-form, with a cylindrical tube; *anthers* with long appendages at the top, joined together *in a ring attached to the stigma*; fr. a pair of elongated follicles. 3 species, in Eurasia; one in China. (Greek name of the Oleander.)

1. **Nerium indicum** Mill. Sweet-scented Oleander 夾竹桃 (Chia Chu T'ao) (B.M. 1st 604). Evergreen shrub or tree, to 7 m.; fls. white, red or purple, fragrant, V-









301. Nymphoides peltatum
302. Catharanthus roseus

303. Nerium indicum
304. Metaplexis japonica

305. Pycnostelma paniculatum
306. Convolvulus sepium

VIII. Mediterranean region; locally in An., Ki., Ku., Planted, ornamental. Fig. 303.

3. **Trachelospermum** Lem. Climbing Dogbane 絡石屬 (Lo Shih Shu)

Evergreen *twining shrub* with opposite lvs. and white cymose fls.; calyx with 5–10 glands or scales inside at the base; anthers united and joined to the stigma: follicles elongated and terete; seeds linear, with a tuft of long hairs. 16 species, tropical and subtropical regions, eastern Asia; 7 in China. (Greek: *trachelos*, neck, and *sperma*, seed.)

Key to the Species

Anthers wholly included within the corolla-throat	1.	*T. jasminoides*
Anther-tips more or less exserted from the orifice of the corolla-tube	2.	*T. gracilipes*

1. **Trachelospermum jasminoides** (Lindl.) Lem. Star Jasmine 絡石 (Lo shih; Rock Rope) (R.M. 798). Twining shrub; fls. white, IV–VI; fr. IX–X. China, Formosa, Indo-China, Japan; locally in An., Che., Hun., Hup., Ki., Ku. Brushland, woodland.
2. **Trachelospermum gracilipes** Hook. f. (Suny. 3: 91). Twining shrub; fls. white, VI–VII; fr. VIII–IX. China, Formosa, Indo-China; locally in Che., Hup., Ki. Rocky woodland.

146. **ASCLEPIADACEAE** Milkweed Family 蘿摩科 (Lo Mo K'o)

Herbs (ours) or shrubs, often twining, with *latex* and usually with opposite entire estipulate lvs.: fls. perfect, regular, 5-merous; *corona* usually present as an outgrowth of the corolla or stamens or both; *filaments united*: *anthers joined to the stigma*; *pollen cohering into* waxy masses called *pollinia*: fr. of 2 follicles. 75–320 genera with 1,800 species, tropical and subtropical regions. 23 genera and 65 species in China.

Key to the Genera

A. Plant vining or decumbent in habit: corolla lobes twisted in the bud; corona lobes fully united.		
Corolla lobes glabrous	1.	*Cynanchum*
Corolla lobes densely stiff-white-hairy within (ours)	2.	*Metaplexis*
AA. Plants erect.		
Infl. mostly lateral; fls. in axillary clusters; pedicels up to one cm. long: lvs. glabrous.		
Corolla lobes ovate-oblong, fleshy or at least thickened at the base	1.	*Cynanchun*
Corolla lobes linear, membranous	3.	*Pentasachme*
Infl. mostly terminal; fls. in slender erect panicles, some from the axils of the upper lvs.; pedicels often over one cm. long: lvs. ciliate on the margins near the base	4.	*Pycnostelma*

1. **Cynanchum** Linn. 白薇屬 (Pai Wei Shu; White Rose Genus)

Erect or twining herbs or shrubs with cordiform or hastate lvs. and greenish or purplish fls.; corolla lobes glabrous or pubescent; corona flat and simple; pollen masses waxy, one pendulous in each cell: follicles terete or with 2 short wings; seeds with a tuft of long hairs. 100 species, tropical and temperate regions; 27 in China. (From the Greek terms meaning "dog", and "to strangle.")

Key to the Species

a. Lvs. oblong or ovate.
  Fls. in pedunculate clusters: lvs. 3-9 cm. wide, with deep wide sinus, glabrous except on the nerves beneath ..... 1. *C. auriculatum*
  Fls. axillary, on slender pedicels: lvs. 1.5-3.0 cm. wide, with shallow sinus, puberulent ..... 2. *C. mooreanum*
aa. Lvs. linear or narrowly lanceolate.
  Plant glabrous: brs. slender: lvs. linear, 8-10 cm. long: fls. dark purple ..... 3. *C. linearifolium*
  Plant pubescent: brs. rather stout: lvs. linear to narrowly lanceolate, 2.5-6.0 cm. long: fls. white..... 4. *C. sibiricum*

1. **Cynanchum auriculatum** Royle ex Wight 飛来鶴 (Fei Lai Hao; Flying Crane) (H.F. 4: 25). Twining herb; fls. white, VIII-IX; fr. IX-X. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Grassland.
2. **Cynanchum mooreanum** Hemsl. (*Vincetoxicum chinense* S. Moore) (J.B. 1875: 228, F.H.E. 2: 108). Twining vine; fls. white, VI. Central China; locally in An., Che., Hup., Ki. Woodland.
3. **Cynanchum linearifolium** Hemsl. (F.H.E. 2: 107). Erect herb, sometimes suffrtescent, to 6 dm. high; fls. dark purple, VII. Eastern and Central China; locally in Hun., Ku. Brushland.
4. **Cynanchum sibiricum** (L.) R.Br. (*Vincetoxicum sibiricum* Linn.) 地稍花 (Ti Shao Hua) (DC.P. 8: 525). Erect herb, to 4 dm.; fls. white, VII-VIII. Northeastern Asia; locally in Ku. Grassland.

2. **Metaplexis** R. Br. 蘿藦属 (Lo Mo Shu)

Vines, woody at the base, with *cordate lvs.* and with fls. in simple racemose cymes; calyx with 5 glands inside at the base; *corolla lobes densely stiff-hairy within* (ours); stamens attached to the base of the corolla: seeds comose. 2 species, in eastern Asia; one in China. (Greek: *meta*, with, and *pleco*, to fold; in reference to the cucullate appendages of the corona.)

1. **Metaplexis japonica** (Thunb.) Miq. (*M. chinensis* (Bunge) Decne.; *M. stauntoni* Roem. & Schult.) 蘿藦 (Lo Mo) (DC.P. 8: 511; F.H.E. 2:110). Twining herb; fls. white, VI-VIII; fr. IX. Eastern Asia; locally in An., Ki., Ku. Grassland, brushland. Fig. 304.

3. **Pentasachme** Wall. ex Wight 五来属 (Wu Lai Shu)

Erect perennial *glabrous herbs*, usually with simple stems, narrow acuminate lvs. and *axillary umbels of 2 or a few* yellowish 5-merous *fls.* on filiform peduncles; pollen masses one in each cell, basally attached: follicles slender, terete; seeds comose. 4 species, in eastern Asia; 2 in China. (Greek: *pente*, five; and *akme*, a point; in reference to the five scales in the throat of the corolla.)

1. **Pentasachme championi** Benth. (Be.F. 228). Erect herb, to 0.5 m.; fls. white, corolla lobes linear, VIII; fr. linear, X. Southern and central China; locally in Hun., Ki. Wet places.

4. **Pycnostelma** Bunge ex Decne. 徐長卿属 (Hsü Ch'ang Ch'ing Shu)

Erect slender glabrous perennial herbs with linear-sublanceolate *lvs.* which are

ciliate on the margins near the base, and green 5-merous fls. in delicate *few-fld. cymes in the axils of the upper lvs.* or bracts; pollen masses one in each cell, pendulous: follicles acuminate; seeds comose. 2 species, in eastern Asia, both occurring in China. (Greek: *pychnos*, dense, and *stelma*, crown.)

1. **Pycnostelma paniculatum** (Bunge) K. Schum. (*P. chinense* Bunge ex Decne.) 徐長卿 (Hsü Ch'ang Ch'ing) (DC.P. 8: 512). Slender herb, to 1 m.; fls. greenish, VI–VII, infl. terminal; fr. IX–X. China; locally in Ki., Ku. Grassland. Fig. 305.

147. CONVOLVULACEAE Morning Glory Family 旋花科 (Hsüan Hua K'o)

Twining *herbaceous vines* (ours); also erect herbs, shrubs and trees; sometimes with latex; usually with alternate simple estipulate lvs.: fls. showy, perfect, regular, 5-merous; *corolla* mostly funnel-form, plicate, *twisted in the bud*; ovary superior, 2-celled: fr. a 1–6-seeded capsule or berry. 50 genera with 1,200 species, cosmopolitan, especially in the tropics; 11 genera and 50 species in China.

Key to the Genera

A. Lfy. creeping twining herbs; green, not parasitic.
  Stigmas 2, linear to ovate ..... 1. *Convolvulus*
  Stigmas capitate, sometimes lobed.
    Stamens and style not exserted: lvs. cleft, lobed or entire, not dissected 2. *Ipomoea*
    Stamens and style exserted; lvs. often dissected ..... 3. *Quamoclit*
AA. Leaffess parasitic twining herbs; never green..... 4. *Cuscuta*

1. **Convolvulus** Linn. Bindweed 旋花屬 (Hsüan Hua Shu)

Lvs. entire (rarely palmately lobed): fls. axillary, solitary, with 2 *large persistent bracts* (ours) enclosing the calyx; sepals ovate or oblong, the inner smaller; stamens included; filaments dilated at the base; anthers oblong; *stigmas* 2, *linear to ovate*; *ovary* 1- (or imperfectly 2-) *celled*: capsule usually 4-seeded. 200 species, in warm countries; 4 in China. (Latin: *convolvere*, to entwine.)

Key to the Species

Plants villous: lvs. oblong to linear, with mucronulate tip, 3–5 cm. long 1. *C. pellitus*
Plants glabrous or finely pubescent, not villous.
  Bracts 1.5–3.5 cm. long, just below the calyx; peduncles 1-fld. ..... 2. *C. sepium*
  Bracts 0.8–1.5 cm. long, separated from the calyx; peduncles often 2-fld. 3. *C. wallichianus*

1. **Convolvulus pellitus** Ledeb. (G.M. 1182). Trailing herb; fls. pink, VII. Asia; locally in Ku. Rocky grassland.
2. **Convolvulus sepium** Linn. (*Calystegia sepium* (L.) R. Br.) Hedge Bindweed 旋花 (Hsüan Hua; Twisted Flower) (B.M. 819). Perennial trailing herb; fls. white or pink, 5–7 cm. long, VI. Temperate regions; locally in Ar., Ki., Ku. Brushland. Fig. 306.
3. **Convolvulus wallichianus** Spreng. (*Calystegia hederacea* Wall. ex Roxb.) 小旋花 (Hsiao Hsüan Hua) (G.M. 1182, H.F. 4: 217). Trailing herb; fls. pink, 2–3 cm. long, V. Asia; locally in An., Ku. Field weed.

2. **Ipomoea** Linn. Morning Glory 甘藷屬 (Kan Shu Shu)

Lvs. cleft, lobed or entire, not dissected: fls. axillary, solitary or cymose; corolla

large and showy, the limb nearly entire; *stamens and style included*; *stigma capitate*: fr. a dehiscent 4–6-seeded capsule. 400 species, in all tropical countries; 27 in China. (Greek: *ips*, a worm, and *homois*, resembling, from the twining habit.)

Key to the Species

a. Sepals broadly ovate, not extending into linear projections or herbaceous lanceolate blades.
  Stems pubescent: lvs., or some of them, lobed or notched: sepals cuspidate: roots fascicled and tuberous ..... 1. *I. batatas*
  Plant glabrous: lvs. entire: sepals not cuspidate: roots not tuberous 2. *I. aquatica*
aa. Sepals extending into linear projections or herbaceous lanceolate blades.
  Lvs. 3-lobed: sepals extending into linear points about 2 cm. long.. 3. *I. hederacea*
  Lvs. entire: sepals extending into erect linear or lanceolate herbaceous blades about 1 cm. long ..... 4. *I. purpurea*

1. **Ipomoea batatas** (L.) Poir. Sweet Potato 紅苕 (Hung Shao); 山芋 (Shan Yü; Sweet Tuber) (B.M. 819). Trailing perennial; fls. rose-violet, rare. Introduced from tropical regions; locally in An., Hun., Hup., Ki., Ku. Cultivated, tubers.
2. **Ipomoea aquatica** Forsk. (*I. reptans* Poir.) 蕹菜 (Yung Ts'ai) (M.F. 392, Ph.J. 59: 452). Spreading annual; fls. white, pink or purplist, VII–X. Introduced from the eastern tropics; locally in An., Ku. Cultivated, vegetable. Fig. 307.
3. **Ipomoea hederacea** (L.) Jacq. (*Pharbitis hederacea* (L.) Choisy) 牽牛子 (Ch'ien Niu Tzŭ; To-lead-an-ox) (B.M. 821). Twining annual; fls. blue or purple, VII–VIII. Tropical and subtropical regions; locally in An., Ki., Ku. Fields and roadsides.

Ipomoea nil (L.) Roth was maintained in Merrill's "Flora of Manila" (p. 390), but was made a synonym of *I. hederacea* in his "Enumeration of Philippine Plants" (3:365). Handel-Mazzetti (Symbolae Sinicae 7:812) has used *I. nil* for specimens collected in Kiangsi Province, and the species is held as distinct from *I. hederacea* in Bailey's "Manual of Cultivated Plants," revised edition (p. 821). Both forms are found cultivated and naturalized in China. It has seemed to the writer that the differences between these forms (including the key character of "tips of sepals spreading or recurved" in *I. hederacea*, while "tips of sepals erect" is applied to *I. nil*) are not sufficiently consistent to justify their separation as distinct species.

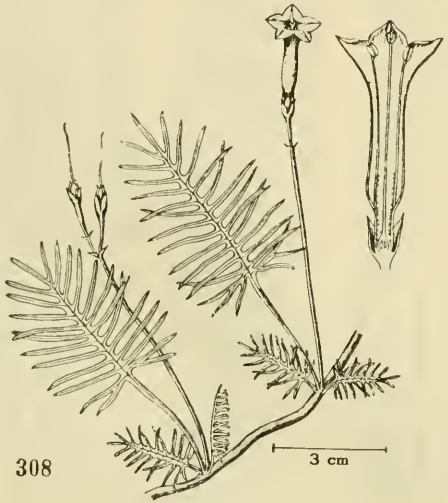
4. **Ipomoea purpurea** (L.) Roth Morning Glory (B.M. 820). Twining annual; fls. purplish, VII–IX. Introduced from tropical America; locally in Che., Hup., Ku. Planted, ornamental.

3. **Quamoclit** Moench 蔦蘿屬 (Niao Lo Shu)

Climbing vines, often with *dissected lvs.* and brightly colored fls. in axillary clusters; calyx lobes often awned; corolla salverform, with a long tube; *stamens and style exserted*; *stigma capitate*: fr. a 4-celled capsule. 10 species, tropical regions; 3 cultivated in China. (From the Greek terms meaning "a dwarf kidney bean".)

Key to the Species

Lvs. deeply cleft or divided,
  Lvs. pinnately dissected into almost filiform segments: sepals cuspidate 1. *Q. pennata*
  Lvs. deeply semi-palmately 7- or more-parted into usually linear divisions: sepals distinctly awned ..... 2. *Q. sloteri*
Lvs. entire or 3-lobed: sepals long-awned ..... 3. *Q. coccinea*



307. Ipomoea aquatica
308. Quamoclit pennata

309. Cuscuta chinensis
310. Phlox drummondii

311. Ehretia acuminata
312. Lithospermum arvense

1. **Quamoclit pennata** (Desr.) Bojer (*Q. vulgaris* Choisy) Cypress Vine 小鳶蘿 (Hsiao Niao Lo) (B.M. 822). Twining annual; fls. red or white, VIII–X. Introduced from tropical America; locally in Ku. Planted, ornamental. Fig. 308.
2. **Quamoclit sloteri** House Cardinal Climber 大鳶蘿 (Ta Niao Lo; Large Twining Plant) (B.M. 822). Twining annual; fls. red, with white eye, X. Hybrid origin; locally in Ku. Planted, ornamental.
3. **Quamoclit coccinea** (L.) Moench Star Ipomoea 圓葉鳶蘿 (Yuan Yeh Niao Lo) (B. M. 822). Twining annual; fls. red, with yellow throat. Introduced from tropical America; locally in Ku. Planted, ornamental.

4. **Cuscuta** Linn. Dodder 菟絲子屬 (T'u Ssŭ Tzŭ Shu)

Yellow or reddish *annual parasitic twiners, without chlorophyll*, but with *lvs. reduced to scales*, and small clustered 5- (or 4-) merous white or greenish fls.; stamens with a scale-like or fringed appendage at the base: capsule mostly 4-seeded. 100 species, widely distributed; 5 in China. (Name supposed to be of Arabic derivation.)

Key to the Species

Stems filiform: fls. subspherical; styles distinct: stigmas globose and exserted.
- Capsule opening between the styles ..... 1. *C. australis*
- Capsule circumscissile ..... 2. *C. chinensis*

Stems thick and fleshy: fls. oblong; styles united, as long as the ovary; stigmas flattened-depressed, oval or conic; capsule circumscissile .. 3. *C. japonica*

1. **Cuscuta australis** R. Br. (Yunck.124). Twining parasitic herb; fls. white, subglobose, VII; fr. VIII. Asia to Australia; locally in Hun., Hup., Ku. Parasitic on herbs.
2. **Cuscuta chinensis** Lam. 菟絲 (T'u Ssŭ) (Yunck.209). Twining parasitic herb; fls. white, subglobose, VI–VIII; fr. VII–IX. Asia to Australia; locally in An., Hun., Hon., Ki., Ku. Parasitic on herbs. Fig. 309.
3. **Cuscuta japonica** Choisy 菟丘 (T'u Ch'iu) (Yunck.252). Twining parasitic herb; fls. white or yellowish, oblong, VI–VIII; fr. VII–X. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Parasitic on herbs or shrubs.

148. **POLEMONIACEAE** Phlox Family 花葱科
(Hua Ts'ung K'o; Flowering-onion Family)

Herbs, rarely shrubs, with estipulate lvs. and perfect regular 5-merous fls.; lobes of the *corolla twisted in the bud*; *ovary* superior, usually 3-*celled*: fr. a *dehiscent* 3-*valved capsule*. 13 genera with 265 species, in the northern hemisphere; 2 genera with 3 or more species in China.

1. **Phlox** Linn. 草夾竹桃科 (Ts'ao Chia Chu T'ao Shu)

Herbaceous or suffruticose plants with *opposite entire lvs.* and brightly colored cymose fls.; corolla with a long tube; *stamens* included and *inserted at different heights on the corolla tube*; capsule often with only one seed in each cell. 50 species, in North America, except one in Siberia; 2 or more cultivated in China. (From the Greek term meaning "flame".)

Key to the Species

- Plant annual: lvs. usually alternate ..... 1. *P. drummondii*
- Plant perennial: lvs. all opposite ..... 2. *P. paniculata*

1. **Phlox drummondii** Hook. Annual Phlox 福禄考 (Fu Lu K'ao; Health, Wealth and Happiness) (B.M.826). Erect annual, to 0.5 m.; fls. rose red. Introduced from North America; locally in Ku. Cultivated, ornamental. Fig. 310.
2. **Phlox paniculata** Linn. Summer Perennial Phlox 草夾竹桃 (Ts'ao Chia Chu T'ao; Herbaceous Oleander) (B.M. 827). Erect perennial, to 1 m.; fls. pink to purple. Introduced from North America; locally in Ku. Cultivated, ornamental.

149. **BORAGINACEAE** Borage Family 紫草科 (Tzŭ Ts'ao K'o)

Herbs, shrubs *or trees* with mostly alternate estipulate *simple* entire rough-hairy *lvs.* and perfect usually regular 5-merous *fls.* in scorpioid racemes, or in cymes; *corolla gamopetalous*, often with appendages at the throat; stamens alternate with the lobes of the corolla, inserted on its tube or throat; *ovary superior*, of two 2-ovuled carpels, *entire or*, more often, *deeply* 4-*lobed*, with the style basal between the lobes: *fr.* usually *of* 4 *nutlets*, sometimes *berry-like*. 100 genera with 2,000 species, widely distributed; 18 genera and over 50 species in China.

Key to the Genera

A. Plants woody, becoming trees: fr. a 1–4-seeded drupe ..... 1. *Ehretia*
AA. Plants herbaceous: fr. separating into 4 nutlets.
  B. Robust herb, 1.0–1.5 m. high; fls. bright blue, 1.5–2.0 cm. across, with conspicuous exserted saccate appendages in the throat: nutlets with a plug-like attachment at the base surrounded by a ring-like collar ..... 2. *Anchusa*
  BB. Low, often slender herbs, up to 3 dm. high: fls. blue, white or pink; appendages, when present, not conspicuously exserted: base of nutlet not surrounded by a ring-like collar.
    C. Nutlets ellipsoid or reniform, not sharply angled.
      Nutlets tuberculate, bearing an areole surrounded by a double margin.
        Nutlets divergent, with backs upturned; margins of areole conspicuous and well-developed ..... 3. *Thyrocarpus*
        Nutlets vertical and parallel, with backs proximate; margins of areole low, rounded and inconspicuous.. 4. *Bothriospermum*
      Nutlets smooth or verrucose, bony, not tuberculate, without areole ..... 5. *Lithospermum*
    CC. Nutlets sharply angled, about 1 mm. long; surface slightly granular ..... 6. *Trigonotis*

1. **Ehretia** Linn. 厚殼樹屬 (Hou K'o Shu Shu)

Deciduous or evergreen *trees* or shrubs with alternate entire or serrate simple lvs. and small 5-merous usually white *fls. in* terminal (rarely axillary) *panicles or corymbs*; stamens 5, usually exserted; ovary 2- or 4-celled: *fr. a* globose *drupe* with 4 one-celled or two 2-celled nutlets. About 50 species in tropical and subtropical regions; 8 in China. (After G.D. Ehret, botanical painter, born in Germany about 1710; died in England 1770.)

Key to the Species

Fls, about 4 mm. long, very many, in long panicles; corolla lobes longer than the tube: lvs. glabrous ..... 1. *E. acuminata* var. *obovata*
Fls. 8–10 mm. long, in cymes; corolla lobes shorter than the tube: lvs. pubescent ..... 2. *E. dicksoni*

1. **Ehretia acuminata** R. Br. var. **obovata** (Lindl.) Johnston (*E. thyrsiflora* (Sieb. & Zucc.) Nakai) 厚殼樹 (Hou K'o Shu; Thick-husk Tree) (R.M. 801, AA.J. 32: 21). Deciduous tree, to 15m.; fls. white, V–VII; fr. orange to brown, VIII–IX. Eastern Asia; locally in An., Che., Ku., Ki. Forest. Fig. 311.
2. **Ehretia dicksoni** Hance 粗糠樹 (Ts'u K'ang Shu; Coarse-chaff Tree) (R.M. 801). Deciduous tree, to 10 m.; fls. white, V–VII; fr. yellowish, IX. Eastern Asia; locally in An., Hun., Hup., Ki., Ku. Forest.

2. **Anchusa** Linn. 牛舌草屬 (Niu Shê Ts'ao Shu)

Coarse hairy biennial or perennial herbs with alternate lvs. and large (1.5–2.0 cm. across) fls. in leafy-bracted scorpioid clusters on elongated brs.; *corolla* trumpet-shaped, *bearing* 5 conspicuous *exserted saccate appendages* in the throat; stamens inserted at middle of corolla-tube, included: *nutlets* wrinkled, *with a plug-like attachment* at the base *surrounded by a ring-like collar.* 30–40 species, in the Old World; one or more cultivated in China. (Greek: *anchousa*, a paint for the skin.)

1. **Anchusa azurea** Mill. (B.M. 837). Robust herb, 1.0–1.5 m. tall; fls. blue, VII; fr. IX. Introduced from the Mediterranean region; locally in Ku. Planted, ornamental.

3. **Thyrocarpus** Hance 盾莢果屬 (Tun Chia Kuo Shu; Shield Fruit)

Herbs with slender erect brs. and alternate lvs.: infl. of scorpioid lfy.-bracted racemes developing at the tips of the brs.: fls. axillary, solitary, short-pedicelled; corolla with 5 small scales in the throat; stamens inserted below the scales on the corolla-tube, included: *nutlets tuberculate, divergent*, each bearing on the back an *areole* surrounded by a conspicuous *cup-like double margin.* 3 species, in China.

1. **Thyrocarpus sampsoni** Hance (E.P.IV. 252: 112). Herb, to 3 dm.; fls. blue, IV–VI; fr. V–VII. China; locally in Hun., Hup., Ku. Grassland.

4. **Bothriospermum** Bunge 斑種屬 (Pan Chung Shu)

Weak annual or biennial strigose *herbs*, with alternate ovate or lanceolate lvs., and small blue or white axillary pedicelled 5-merous fls., the upper ones becoming a bracteate raceme; ovary deeply 4-lobed, becoming in *fr.* 4 brownish *glandular-tuberculate* ellipsoid *nutlets.* 4–5 species, in Asia; most of them found in China. (Greek: *bothrion*, a small pit, and *sperma*, seed; in reference to a deep pit on the inner side of each carpel.

Key to the Species

Nutlet reniform, bent; areole appearing transverse: corolla with 5 scale-like appendages ..... 1. *B. chinense*
Nutlet ellipsoid; areole longitudinal.
Infl. definitely secund; corolla with 10 scale-like appendages ..... 2. *B. secundum*
Infl. not secund; corolla without distinct appendages ..... 3. *B. tenellum*

1. **Bothriospermum chinense** Bunge 龍腸草 (Lung Ch'ang Ts'ao) (DC.P. 10: 117). Slender herb, to 0.3 m.; fls. blue or white, V–VI; fr. VI–VII. Northern China; locally in An., Ku. Open ground.
2. **Bothriospermum secundum** Maxim. (Max. F. 202). Erect or spreading herb, to 0.3 m.; fls. blue or white, V–VIII; fr. VI–IX. Northern China; locally in An., Hup., Ku. Open ground.

3. **Bothriospermum tenellum** Fisch. & Mey. 細蘗子草 (Hsi Jui Tzŭ Ts'ao) (Be.F. 235). Spreading herb, to 0.4 m.; fls. blue or white, III–VII. Asia; locally in Hun., Ku. Open ground.

5. **Lithospermum** Linn. Gromwell 紫草属 (Tzŭ Ts'ao Shu; Purple-herb Genus)

Rough-hairy *herbs* with alternate entire lvs. and 5-merous blue, pink, white or yellow fls. in lfy. bracted spikes or racemes; corolla funnel-form or salver-form, sometimes pubescent or crested in the throat; stamens 5: filaments short; ovary 4-parted; stigma capitate or 2-lobed: *nutlets* 4 or fewer, white, *smooth* and shining *or* brown and *wrinkled, not sharply angled*, 3–4 *mm. long*; scar of attachment not concave. About 40 species, mostly of the northern hemisphere; 5 in China. (Greek: *lithos*, stone, and *sperma*, seed; referring to the hard nutlets.)

Key to the Species

Corolla 5–8 mm. long, blue, white or pink: lvs. lanceolate: nutlets gray or brown, verrucose ..... 1. *L. arvense*
Corolla 15–20 mm. long, bluish purple: lvs. oval to oblong: nutlets white, smooth and shining ..... 2. *L. zollingeri*

1. **Lithospermum arvense** Linn. Corn Gromwell 犬紫草 (Ch'üan Tzŭ Ts'ao; Dog Gromwell) (G.M. 1201). Erect or spreading herb, to 3 dm.; fls. white, pink, or blue, IV; fr. V–VI. Eurasia and northern Africa; locally in An., Ku. Open ground. Fig. 312.
2. **Lithospermum zollingeri** A. DC. 梓木草 (Tzŭ Mu Ts'ao; Lindera Herb) (DC.P. 10: 587). Spreading perennial, to 2 dm.; fls. bluish purple, III–V; fr. IV–VI. Eastern Asia; locally in An., Ku. Open rocky slopes.

6. **Trigonotis** Stev. 附地菜属 (Fu Ti Ts'ai Shu)

Weak perennial *herbs*, with alternate ovate or lanceolate lvs., and small pedicelled axillary bracteate or ebracteate 5-merous white or blue fls.; corolla tube shorter than the calyx: ovary deeply 4-lobed, becoming in *fr.* 4 *small* (about 1 mm. long) brown slightly granular *sharply-angled nutlets*. 10 species, central and eastern Asia; 4 in China.

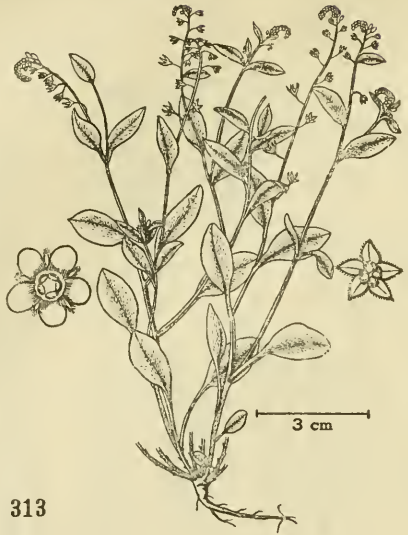
Key to the Species

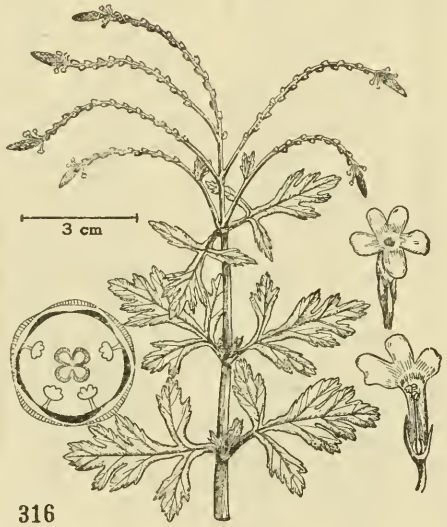
Nutlet with an opaque flange bordering the upper face 1/2–1/3 as wide as the nutlet is broad ..... 1. *T. cupulifera*
Nutlet without flange, shining and pubescent on upper surface ..... 2. *T. peduncularis*

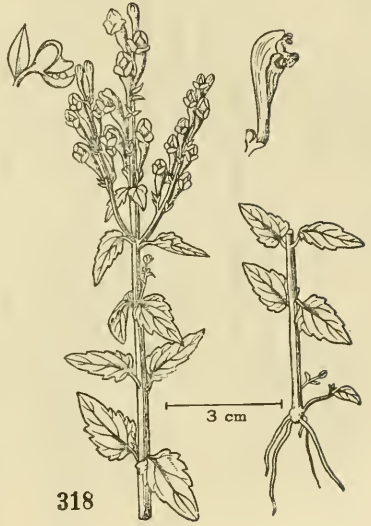
1. **Trigonotis cupulifera** Johnston (AA.J. 33:69). Slender herb, to 3 dm.; fls. blue, IV–V; fr. V–VI. Central China; locally in Hun., Ki. Open ground.
2. **Trigonotis peduncularis** (Trev.) Benth. ex Forbes & Hemsl. (*Eretrichum pedunculare* (Trev.) A.DC.) 附地菜 (Fu Ti Ts'ai; Decumbent Green) (Mak.F. 190). Slender spreading herb, to 5 dm.; fls. blue, III–V; fr. IV–VI. Eurasia; locally in An., Che., Hun., Ki., Ku. Open ground. Eaten in famine times. Fig. 313.

150. **VERBENACEAE** Verbena Family 馬鞭草科 (Ma Pien Ts'ao K'o)

Herbs, shrubs or trees with opposite, verticillate or rarely alternate simple, *pinnatifid or compound* estipulate *lvs.* and perfect usually more or less *irregular* 4-5-merous *fls.*; *corolla gamopetalous*; stamens 4, didynamous (rarely 2 or 5), inserted on the corolla and alternate with its lobes; anthers 2-celled and longitudinally dehiscent;







313. Trigonotis peduncularis
314. Clerodendron trichotomum

315. Vitex negundo
316. Verbena officinalis

317. Ajuga decumbens
318. Scutellaria barbata

ovary superior, of 2, 4 or 5 carpels: fr. a drupe or berry, often separating at maturity into 2–4-*nutlets*. About 98 genera with 2,615 species; 15 genera and 70 species in China.

Key to the Genera

A. Fls. pedicelled, in cymes or panicles.
  B. Lvs. simple.
    C. Fr. fleshy, drupe-like.
      Corolla regular; stamens equal, not long exserted ..... 1. *Callicarpa*
      Corolla irregular; stamens in unequal pairs, often long exserted.
        Fls. large, up to 2 cm. long: drupe with 4 nutlets ..... 2. *Clerodendron*
        Fls. small, about 5 mm. long: drupe with one nutlet ..... 3. *Premna*
    CC. Fr. dry, capsular ..... 4. *Caryopteris*
  BB. Lvs. palmately compound: fr. dry ..... 5. *Vitex*
AA. Fls. sessile, in slender spikes or head-like clusters.
    Fr. dry, separating into 4 nutlets..... 6. *Verbena*
    Fr. a fleshy drupe, with 2 bony carpels..... 7. *Lantana*

1. **Callicarpa** Linn. 紫珠属 (Tzŭ Chu Shu)

Shrubs or trees with opposite *simple* usually serrate *lvs.* and small blue, purple or white 4-merous fls. in axillary cymes; corolla regular, with a short tube; *stamens* 4, *equal*, *not long exserted*, with a small staminode; ovary 4-celled, 4-ovuled; stigma small and simple: fr. a small berry-like drupe, longer than the calyx, with 2–4 stones. About 40 species, mostly in tropical and subtropical eastern Asia, Malaya, Australia and America; 16 in China. (Greek: *kallos*, beauty, and *karpos*, fruit.)

Key to the Species

a. Calyx tubular, deeply 4-cleft, the lobes each bearing in flower a long slender tip or appendage: brts. stout, densely fulvous tomentose: lf. blades 14–24 × 4–8 cm ..... 1. *C. loureiri*
aa. Calyx campanulate or cyathiform, the rim very shortly toothed or nearly truncate.
  b. Peduncles of the infl. shorter than the petioles, or sometimes as long.
    Brts. stellate pubescent, becoming more or less glabrous: lvs. lanceolate (often narrowly so), acuminate, 10–20 × 2.5–5.0 cm., short-petiolate, nearly glabrous at maturity; margins sharply serrate towards the tip, somewhat wavy: peduncles of the infl. very short: calyx glabrous or nearly so in fruit ..... 2. *C. brevipes*
    Brts. scurfy-stellate-pubescent: lvs. broadly elliptic to lanceolate-oblong, 5–15 cm. long, acuminate; cuneate at base; margins serrate ..... 3. *C. bodinieri*
  bb. Peduncles of the infl. longer than the petioles.
    c. Leaf blades cuneate or rounded at base, not at all cordate.
      Leaf blades cuneate: margins serrate.
        Leaf margins sharply dentate above the middle, but not on the acuminate tip; blades 2–8 × 1.0–3.5 cm.: anthers short-oblong, opening by slits.... 4. *C. dichotoma*
        Leaf margins irregularly serrate, except at base; blades 5–12 × 1.5–4 cm.: anthers narrowly oblong, opening by terminal pores ..... 5. *C. japonica*

Leaf blades, or most of them, rounded at the base, but not cordate; broadly ovate or oblong, 4–7×8–14 cm,, margins entire ..... 6. *C. integerrima*

cc. Leaf blades more or less cordate at base, panduriform, acuminate, sessile or with very short petioles, 4–9×8–20 cm.; margins coarsely serrate ..... 7. *C. rubella* var. *hemsleyanum*

1. **Callicarpa loureiri** Hook. & Arn. (Fe.R.40:116). Shrub or tree, to 4 m.; fls. pink-purple, fragrant, VII–VIII; fr. IX–XII. South China, Formosa, Japan; locally in Che., Ki. Woodland shade.
2. **Callicarpa brevipes** (Benth.) Hance (*C. longifolia* Hook., non Lam.) (P'ei 45). Shrub, to 1.5 m.; fls. white or pink, VII; fr. purplish red, IX. Southern and central China; locally in Hun., Hup., Ki. Forest.
3. **Callicarpa bodinieri** Lévl. 老鴉糊 (Lao Ya Hu) (R.M.804). Shrub, to 3 m.; fls. lilac to violet, VII–IX; fr. violet, IX–X. Eastern, central and southern China; locally in An., Che., Hun., Ki., Ku. Woodland.

3a. **Callicarpa bodinieri** Lévl. var. **giraldii** (Rehd.) Rehd. (*C. giraldiana* Hesse ex Rehd.) (R.M.804). Lvs. glabrous above, sparingly fasciculate-pubescent beneath. An., Che., Hun., Ki., Ku.

4. **Callicarpa dichotoma** (Lour.) K. Koch. 紫珠 (Tzŭ Chu; Purple Pearl) (R.M.803). Shrub, to 1.5 m.; fls. pink, VII; fr. lilac, IX–XI. Eastern and central China, Korea; locally in An., Che., Hon., Hun., Ki., Ku. Forest.
5. **Callicarpa japonica** Thunb. 粟苔 (Su T'ai) (R.M.804). Shrub, to 1.5 m.; fls. pink or whitish, VI–VII; fr. violet, X–XI. Central China; locally in An., Che., Ki., Ku. Forest.

5a. **Callicarpa japonica** Thunb. var. **angustata** Rehd. (R.M.804). Lvs. oblong lanceolate to oblanceolate, 5–12×1.5–3.5 cm. An., Hup., Ki., Ku.

6. **Callicarpa integerrima** Champ. ex Benth. (P'ei 22). Shrub, 3–4 m. high; fls. white or purplish red, fragrant, VII; fr. IX. Southern and central China; locally in Che., Ki. Moist woodland.
7. **Callicarpa rubella** Lindl. var. **hemsleyana** Diels (*C. panduriforme* Lévl.) (P'ei 40). Shrub, to 2 m.; fls. white, VII; fr. purplish, IX. Southern, central and western China; locally in An., Che., Hun., Ki. Forest.

2. **Clerodendron** Linn. Glorybower 海州常山屬 (Hai Chou Ch'ang Shan Shu)

Shrubs or trees, often climbing, with opposite or verticillate *simple lvs.*: *fls. large, up to 2 cm. long*, 5-merous, usually in terminal panicles; calyx persistent, campanulate or tubular, often enlarged and colored in fr.; *corolla* tube usually slender, the limb somewhat *irregular*; *stamens* 4, inserted on the corolla tube, *long exserted* and curved; style exserted, 2-cleft: *fr. a drupe*, often enclosed in the calyx, with juicy exocarp and 2–4-*parted stone*. About 100 species, mostly tropical; 20 in China. (Greek: *kleros*, chance, and *dendron*, tree, referring to two species in Ceylon called by early botanists the "tree of fortune" and the "tree of misfortune".)

Key to the Species

a. Infl. an open panicle or a spreading cyme; bracts linear-subulate, minute or obsolete.

b. Axes of the infl. slender, glabrous or puberulent; some primary brs. of the infl. in the axils of the upper lvs.; calyx lobes ovate.

c. Corolla-tube short, not over 1 cm. long; fls. numerous: lvs. lanceolate-elliptic (rarely ovate), acute or acuminate, 3–8 × 7–20 cm.; margins mostly entire .. 1. *C. cyrtophyllum*

cc. Corolla-tube longer, to 3.5 cm. long; fls. few: lvs. ovate to oblong, acute or acuminate, 5–15 cm. long; margins mostly entire, sometimes coarsely dentate ..... 2. *C. trichotomum*

bb. Axes of the infl. stout, tomentose; infl. a terminal cyme dividing from the base into 5 or 7 robust divaricate primary brs.; calyx lobes slender and elongated: lf. blades pubescent, ovate, 7–16 × 14–28 cm ..... 3. *C. mandarinorum*

aa. Infl. dense, cymose or head-like; axes of the infl. stout; bracts leaf-like.

Calyx and bracts shorter than or equal to the fruit, with large peltate glands; bracts mostly deciduous; style shorter than or equal to the stamens ..... 4. *C. bungei*

Calyx and bracts much longer than the fruit, without large peltate glands; bracts persistent; style longer than the stamens.. 5. *C. viscosum*

1. **Clerodendron cyrtophyllum** Turcz. (*Cordia venosa* Hemsl.) 大青 (Ta Ch'ing; Large Youth) (P'ei 147). Shrub, to 4 m.; fls. white VII–VIII; fr. black, VIII–IX. Southern, central and western China, Formosa, Indo-China; locally in An., Che., Hun., Ki., Ku. Forest.
2. **Clerodendron trichotomum** Thunb. 海州常山 (Hai Chou Ch'ang Shan) (R.M.805). Shrub or tree, to 8 m.; fls. reddish, VIII–IX; fr. blue, IX–X. Eastern and central China, Formosa, Japan, Korea, Philippines; locally in Che., Hup., Ki., Ku. Forest. Fig. 314.

2a. **Clerodendron trichotomum** Thunb. var. **fargesii** (Dode) Rehd. (R.M.805). Brts. and lvs. glabrous or glabrescent: lvs. smaller: calyx lobes narrower. An., Che., Hup., Ki., Ku.

3. **Clerodendron mandarinorum** Diels (P'ei 145). Shrub or tree, to 7 m.; fls. white, VII; fr. blue-black, X. Central, western and southern China; locally in Hup., Ki. Forest.
4. **Clerodendron bungei** Steud. (*C. foetidum* Bunge, not D. Don) 臭牡丹 (Ch'ou Mu Tan; Stinking Peony) (R.M.806). Shrub, to 2 m.; fls. pink, red, VI–X. China; locally in An., Che., Hun., Ku. Forest.
5. **Clerodendron viscosum** Vent. (P'ei 130). Shrub or tree, to 5 m.; fls. white, VI; fr. blue-black with red bracts, IX–X. Central, southern and western China; locally in Che., Ki. Woodland.

3. **Premna** Linn. 臭娘子属 (Ch'ou Niang Tzŭ Shu)

Trees or shrubs, sometimes climbing, with opposite *simple lvs.* and *small* (about 5 mm. long) greenish or yellowish white often polygamous *fls. in lax clusters*; corolla tubular, sometimes almost equally 4-lobed; the throat hairy; stamens 4, didynamous; style linear, bifid: fr. a globose to oblong *drupe with one nutlet*. 40 species, in eastern Asia; 10 in China. (Greek term meaning "stump", referring to the short stems of some species).

1. **Premna microphylla** Turcz. 臭黄荆 (Ch'ou Huang Chin; Ill-smelling Vitex) (P'ei 81). Shrub, to 3 m.; fls. yellow, VI; fr. black, VIII. China, Japan; locally in An., Che., Ki., Ku. Woodland.

4. **Caryopteris** Bunge Bluebeard 蔥屬 (Yu Shu)

Small deciduous shrubs or herbs with opposite *simple lvs.* and 5-merous fls. in axillary cymes; calyx somewhat enlarged in fr.; corolla with a short cylindric tube; one corolla lobe larger and fringed; stamens 4, exserted, 2 of them longer; style slender, 2-cleft: *fr. dry*, separating into 4 somewhat *winged nutlets*. About 10 species, in eastern Asia; 6 or more in China. (Greek: *karyon*, nut; and *pteron*, wing.)

Key to the Species

Fls. in dense cymes, without bracteoles; lower corolla lobe toothed or fimbriate ..... 1. *C. incana*
Fls. solitary with short linear bracteoles; lower corolla lobe entire.. 2. *C. nepetaefolia*

1. **Caryopteris incana** (Thunb. ex Houtt.) Miq. Bluebeard 蔥 (Yu; Foul-smelling Herb) (R.M.806). Shrub, to 2.5 m.; fls. lavender, blue, IX–X. Japan, eastern and northern China; locally in An., Che., Hun., Hup., Ki. Brushland.
2. **Caryopteris nepetaefolia** Maxim. (P'ei 173). Herb, to 1 m.; fls. lavender, IV–VI. China; locally in An., Che., Ku. Brushland.

5. **Vitex** Linn. 黃荊屬 (Huang Chin Shu)

Shrubs or trees, sometimes prostrate, with opposite *digitate lvs.* (rarely reduced to one lft.) *fls. pedicelled*, small, 5-merous, white, blue or yellow, in terminal and axillary panicled cymes; stamens 4, usually exserted: *fr.* a small drupe, *dry* at maturity, with a 4-celled stone, surrounded by a somewhat enlarged persistent calyx. About 60 species, in most warm countries; 10 in China. (Old name of *V. agnus-castus*.)

Key to the Species

a. Lvs. digitate, 3–5-foliolate; lfts. oblong to lanceolate, 1–14 cm. long.
  Lfts. grayish tomentose beneath.
    Lfts. entire or with a few teeth..... 1. *V. negundo*
    Lfts. incisely serrate or nearly pinnatifid ..... 1a. *V. negundo* var. *heterophylla*
  Lfts. green on both surfaces ..... 1b. *V. negundo* var. *cannabifolia*
aa. Lvs. simple, obovate to oval, 2–6 cm. long, entire, white tomentulose beneath ..... 2. *V. rotundifolia*

1. **Vitex negundo** Linn. 黃荊 (Huang Chin; Yellow Bramble) (R.M.805). Shrub or tree, to 5 m.; fls. bluish lavender, VII–VIII. India, China, Korea; locally in An., Che., Hon., Hup., Ki., Ku. Woodland, brushland. Fig. 315.

1a. **Vitex negundo** Linn. var. **heterophylla** (Franch.) Rehd. (*V. negundo* Linn. var. *incisa* (Lam.) C.B.Clarke) (R.M.805; R.B.585). An., Che., Ki., Ku.

1b. **Vitex negundo** Linn. var. **cannabifolia** (S. & Z.) Hand.-Mazz. (*V. cannabifolia* Sieb. & Zucc.) 牡荊 (Mu Chin; Male Bramble) (P'ei 108). An., Ki., Ku.

2. **Vitex rotundifolia** Linn. f. (*V. trifolia* Linn. var. *unifoliolata* Schauer) (R.M.902). Prostrate or ascending woody vine, to 1 m., fls. blue, VI–VIII. India to Japan, Malaysia, Polynesia; locally in Che., Ku. Sandy seashores.

6. **Verbena** Linn. Vervain 馬鞭草屬 (Ma Pien Ts'ao Shu)

Herbs or subshrubs, mostly with opposite *simple* rarely entire *lvs.* and variously colored *sessile* 5-merous *fls. in* terminal *often clustered spikes*: calyx 5-angled or -ribbed: corolla tube sometimes curved, the limb somewhat 2-lipped: stamens 4, included:

ovary 4-celled: *fr. dry*, enclosed in the calyx, *separating into* 4 *nutlets*. About 100 species, in America and the Mediterranean region; 2 in China. (The Latin name of *V. officinalis*.)

Key to the Species

Infl. a convex or flattish corymb ..... 1. *V. hybrida*
Infl. an elongated slender spike..... 2. *V. officinalis*

1. **Verbena hybrida** Voss Common Garden Verbena 美人櫻 (Mei Jên Ying) (B.M.841). Decumbent herb; fls. various, VI–VIII. Hybrid origin; locally in Ku. Planted, ornamental.
2. **Verbena officinalis** Linn. European Vervain 馬鞭草 (Ma Pien Ts'ao; Horse-whip Herb) (G.M.1210). Erect herb, to 1 m.; fls. bluish purple, V–VII. Introduced from Europe; locally in An., Ki., Ku. Roadside weed. Fig. 316.

7. **Lantana** Linn. 馬纓丹屬 (Ma Ying Tan Shu)

Erect or half-climbing shrubs, usually prickly, pubescent or scabrous, with simple crenate lvs. and *sessile* 4–5-merous *fls.* in axillary spike-like heads; corolla slightly irregular; stamens 4, attached in the middle of the corolla tube, included; ovary 2-celled: *fr. a* fleshy *drupe with* 2 *bony nutlets*. About 50 species, mostly of tropical America; 2 in China. (An old name for a *Viburnum*.)

1. **Lantana camara** Linn. 馬纓丹 (Ma Ying Tan; Red Horse-tassel) (B.M.842). Shrub, to 7 m.; fls. various, VII–X; fr. purple, black. Introduced from tropical America; locally in Ku. Planted, ornamental.

151. **LABIATAE** Mint Family 唇形科 (Ch'un Hsing K'o; Lip-form Family)

Herbs or shrubs, usually aromatic and with 4-sided stems: lvs. simple, opposite or whorled, without stipules: *fls.* mostly *irregular*, perfect, 5-merous, *in dense axillary fascicles*; *stamens* 4, didynamous, or 2, *inserted on the corolla tube*; *ovary superior*, with a prominent disk at the base, *deeply* 4-*lobed*; style slender, with 2 stigmas, from the center of the lobed or parted ovary; *fr. of* 4 one-seeded *nutlets*. About 200 genera with 3,200 species, in temperate and tropical regions; 60 genera and 335 species in China.

Key to the Genera

A. Styles not gynobasic; upper lip of the corolla much shorter than the lower, notched or bifid: nutlets with a large lateral or oblique scar of attachment.
  Corolla limb apparently one-lipped, deeply cleft between the two small upper lobes; middle lobe larger than the lateral ..... 1. *Teucrium*
  Corolla limb 2-lipped; the upper lip very short, notched; the lower lip larger, with the middle lobe cleft or emarginate..... 2. *Ajuga*
AA. Styles gynobasic; upper lip of the corolla equal to or longer than the lower, usually entire: nutlet with a small basal scar of attachment.
  B. Calyx 2-lipped; lobes closed in fr.
    Fls. in terminal spikes or racemes; bracts of the infl. not overlapping; calyx bearing a helmet-like projection on the upper side ..... 3. *Scutellaria*
    Fls. in dense cylindric or head-like terminal spikes; bracts of the infl. overlapping; calyx without helmet-like projection.. 4. *Prunella*

BB. Calyx lobes open, campanulate in fr.
C. Stamens and style very short, included in the corolla tube .. 5. *Marrubium*
CC. Stamens or style, or both, more or less exserted from the corolla tube.
D. Corolla strongly 2-lipped.
E. Anther-bearing stamens 4; anthers 2-celled, ovate.
F. Stamens of upper pr. longer than the lower.
Fls. in dense terminal spike-like panicles: erect plant, to 1 m. high: anther cells parallel .. 6. *Agastache*
Fls. in loose axillary whorls: weak-stemmed decumbent or creeping plant: anther cells divergent..... 7. *Glechoma*
FF. Stamens of upper pr. shorter than the lower.
G. Upper lip of corolla arched or hooded, villous.
H. Style lobes unequal, the upper lobe shorter. 8. *Phlomis*
HH. Style lobes equal or nearly so.
Nutlets 3-angled, truncate at the apex.
Upper lip of the corolla pubescent, but not white-woolly-hairy; calyx teeth subulate but not spiny: lvs. crenate or serrate..... 9. *Lamium*
Upper lip of the corolla densely whitish-woolly-hairy; calyx teeth lpiny: vs. lobed or incised .... 10. *Leonurus*
Nutlets ovoid, with rounded apex: calyx teeth sharply pointed..... 11. *Stachys*
GG. Upper lip of corolla short, broad, 3-4-fid, recurved; calyx teeth acute or obtuse, not sharply pointed ..... 12. *Plectranthus*
EE. Anther-bearing stamens 2; anthers 1-celled linear .. 13. *Salvia*
DD. Corolla slightly 2-lipped, or lobes almost equal.
I. Anther-bearing stamens 2.
Robust stoloniferous perennials with simple erect stems: fls. in dense axillary whorls: lvs. sharply serrate or incised, not aromatic..... 14. *Lycopus*
Brg. annuals with slender stems: fls. in 1-sided racemes or spikes: lvs. aromatic, often serrate ..... 15. *Mosla*
II. Fertile stamens 4.
J. Fls. in axillary whorls or capitate.
Corolla rather distinctly 2-lipped: plants not aromatic ..... 16. *Satureja*
Corolla nearly regular: plants strongly aromatic 17. *Mentha*
JJ. Fls. clustered, or in racemes or spikes, not in axillary whorls or capitate.
K. Fls. in terminal leafy or leafy-bracted clusters, not in racemes or spikes.
Stems erect: flg. bracts large, ovate, overlapping; calyx equally 5-toothed ..... 18. *Origanum*
Stems decumbent or prostrate: flg. bracts small, subulate; calyx 2-lipped..... 19. *Thymus*
KK. Fls. in terminal or axillary spikes or racemes.
L. Fls. in dense spikes.

Lvs. verticillate (in our species), linear and sessile or nearly so..... 20. *Dysophylla*
Lvs. opposite, ovate or lanceolate and petiolate ..... 21. *Elsholtzia*
LL. Fls. on evident pedicels, in racemes or in lax axillary whorls.
Leaf blades mostly 5 cm. or less long; each floral leaf subtending 3 fls. .. 22. *Ocimum*
Leaf blades, or some of them, usually 6-15 cm. long: each floral leaf subtending 1 fl. ..... 23. *Perilla*

1. **Teucrium** Linn. Germander 苦草属 (K'u Ts'ao Shu)

Herbs or shrubs with rather small pink, white or purplish fls. in axillary or terminal spikes or heads; calyx 10-nerved; *corolla* tube short; *limb apparently one-lipped*, deeply cleft between the two small upper lobes; middle lobe larger than the lateral; stamens 4, exserted, the anterior pair longer; *style not gynobasic*: nutlets minute, obovoid, wrinkled and reticulate. 160 species, in warm regions; 10 in China. (Named for the Trojan King, Teucer.)

Key to the Species

Lvs. ovate to lanceolate: calyx teeth nearly equal: nutlets smooth .. 1. *T. stoloniferum*
Lvs. lanceolate: calyx with upper tooth largest: nutlets granulate .. 2. *T. pernyi*

1. **Teucrium stoloniferum** Hamilt. ex Benth. 野藿香 (Yeh Huo Hsiang; Wild Lopanthus) (Be.F.279). Erect herb, to 1.2 m.; fls. pink, VII. Southeastern Asia, Java; locally in Che., Hun., Hup., Ki., Ku. Forest.
2. **Teucrium pernyi** Franch. (Sun 11). Erect herb, to 0.8 m.; fls. white or greenish, VIII. China; locally in Che., Hup., Ki., Ku. Woodland.

2. **Ajuga** Linn. Bugle Weed 筋骨草属 (Chin Ku Ts'ao Shu)

Annual or perennial often stoloniferous herbs with mostly dentate lvs. and rather large fls. in axillary or terminal lfy. clusters; calyx 10-many-nerved; *corolla limb* 2-*lipped*; *the upper lip* very short, *notched*; the lower lip larger, with the middle lobe cleft or emarginate; stamens 4, didynamous, the anterior pr. longer; *style not gynobasic*; ovary not deeply lobed: nutlets obovoid, wrinkled and reticulate. About 40 species, in the eastern hemisphere; 6 in China. (From the Greek terms meaning "without a yoke", from the apparent absence of the upper lip of the corolla.)

Key to the Species

Lvs. petioled: fls. white: plant pilose ..... 1. *A. decumbens*
Lvs. (at least the flg. ones) sessile: fls. blue: plant lanate ..... 2. *A. genevensis*

1. **Ajuga decumbens** Thunb. (DC.P.12:598). Herb, to 3 dm.; fls. white, IV-V. Japan, China; locally in An., Che., Hun., Hup., Ku. Roadsides. Fig. 317.
2. **Ajuga genevensis** Linn. 多花筋骨草 (To Hua Chin Ku Ts'ao; Many-flowered-veinbone Herb) (B.M.849). Herb, to 3 dm.; fls. blue, IV. Eurasia; locally in An., Ku. Roadsides.

3. **Scutellaria** Linn. Skullcap 黄芩属 (Huang Ling Shu)

Herbs or subshrubs: fls. variously colored, borne singly in the axils of lvs. or

bracts which do not overlap, not clustered; *calyx* 2-lipped, the upper lip *bearing* on the back *a* helmet-like pouch or *scutellum*; the *calyx lobes closed in fr.*; corolla tube long exserted, glabrous within; stamens 4; the anthers hairy; *style gynobasic*: nutlets very small, rarely smooth. 150 or more species, in temperate mountainous regions; 20 in China. (Latin, meaning "a dish", referring to the form of the persistent calyx.)

KEY TO THE SPECIES

Infl. axillary; fls. subtended by ordinary lvs..... 1. *S. guiliemi*
Infl. terminal; fls. in racemes, subtended by reduced lvs. or bracts.
Lvs. orbicular or ovate; petioles 5–15 mm. long: stems pubescent: racemes 2–3.5 cm. long..... 2. *S. indica*
Lvs. lanceolate or ovate-oblong; petioles 1–3 mm. long: stem glabrous except at the nodes: racemes over 3.5 cm. long..... 3. *S. barbata*

1. **Scutellaria guiliemi** A. Gray (*S. hederacea* A. Gray, non Kunth) (Kudo 268). Herb, to 3 dm.; fls. lavender, IV. Japan, eastern China; locally in Ku. Moist ground.
2. **Scutellaria indica** Linn. 立浪草 (Li Lang Ts'ao) (Be.F.278). Erect herb, to 4 dm.; fls. bluish purple, IV–V. Eastern Asia; locally in Hun., Hup., Ki., Ku. Moist places.
3. **Scutellaria barbata** D. Don (*S. rivularis* Wall.) 岐草黃芩 (Ch'i Ts'ao Huang Ling; Forked-herb Yellow-tuber) (H.F.4:670). Herb, to 5 dm.; fls. bluish purple, III–VI. The Himalayas, China, Japan, Formosa; locally in An., Che., Ki., Ku., Hun., Hup. Wet places. Fig. 318.

In addition to the species of *Scutellaria* keyed above, there are undoubtedly several others occurring in the area. Records for the area have been published under each of the following names: *S. angulosa* Benth., *S. galericulata* Linn., *S. scandens* D. Don, *S. sciaphila* S. Moore, *S. scordiofolia* Fisch., *S. violacea* Heyne. Without more material than was available, the writer was unable to determine which of these should be added.

4. **Prunella** Linn. SELF-HEAL 夏枯草屬 (Hsia K'u Ts'ao Shu)

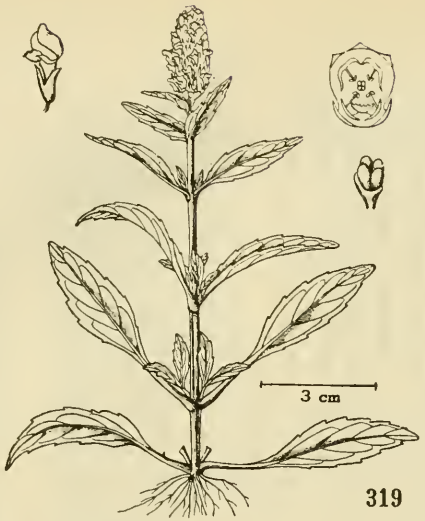
Perennial herbs with petiolate lvs. and sessile 3-fld. clusters of purple or rarely white *fls. in dense bracteate* terminal or sometimes axillary *spikes or heads*; bracts of the infl. overlapping; *calyx 2-lipped*, 10-nerved, *closed in fr.*; corolla tube somewhat dilated below and slightly narrower at the mouth; stamens 4, exserted, the upper pr. shorter than the lower; filaments bifid at the apex, one tooth bearing the anther: nutlets ovoid, smooth. About 5 species, widely distributed; one in China. (Perhaps from the German *Braune*, a disease of the throat for which this plant is supposed to be a remedy. A pre-Linnaean form of the name was Brunella.)

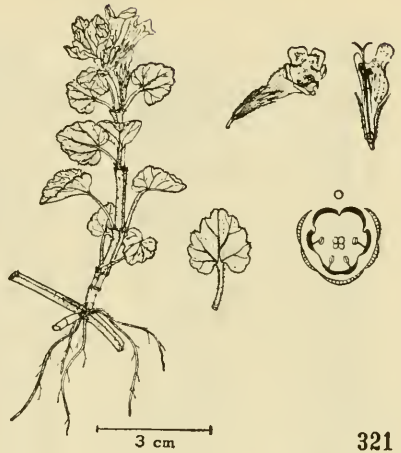
1. **Prunella vulgaris** Linn. HEAL ALL 夏枯草 (Hsia K'u Ts'ao; Summer-withered Herb) (G.M.1225). Perennial, to 4 dm.; fls. purple, rarely white, V–VII. Eurasia, North America; locally in Che., An., Hun., Hup., Ku. Roadsides. Fig. 319.

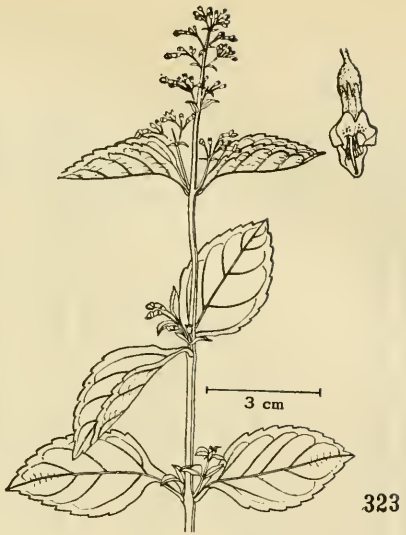
1a. **Prunella vulgaris** Linn. var. **lanceolata** (Bart.) Fern. (G.M.1225) Principal median cauline lvs. lanceolate to oblong, less than one-half as broad as long. Che., Hup., Ki., Ku.

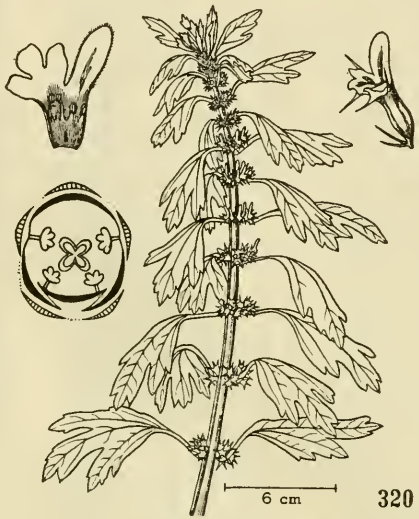
5. **Marrubium** Linn. HOREHOUND 仮充蔚屬 (Chia Ch'ung Wei Shu)

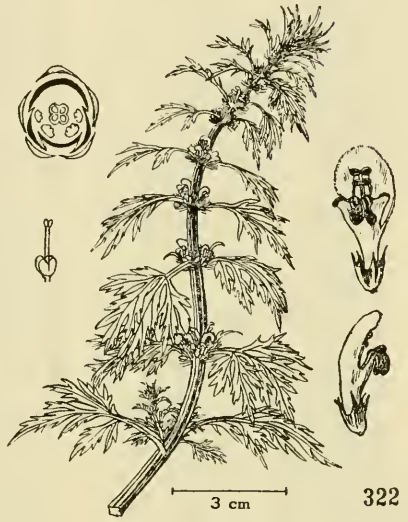
Perennial tomentose or woolly herbs with crenate or cleft lvs. and bitter juice: fls.











319. Prunella vulgaris
320. Marrubium incisum

321. Glechoma hederacea
322. Leonurus sibiricus

323. Plectranthus nervosus
324. Mosla dianthera

small, white or purplish, in crowded axillary whorls; *calyx* tubular, 5–10–nerved, *open in fr.*; corolla tube short; *stamens* 4, *included*, straight; *style gynobasic*, 2–cleft, *included*; ovary deeply 4–lobed: nutlets ovoid, smooth. About 40 species, Eurasia and North Africa; one in China. (From the Hebrew, *marrob*, a bitter juice.)

1. **Marrubium incisum** Benth. 假苎麻 (Chia Ch'ung Wei; False Motherwort) (Sun 19). Herb, to 0.6 m.; fls. white, IV–V. Continental eastern Asia; locally in An., Che., Hon., Hup., Ki., Ku. Roadsides. Fig. 320.

6. **Agastache** Clayt. Giant Hyssop 排香草属 (P'ai Hsiang Ts'ao Shu)

Tall perennial herbs with ovate serrate petiolate lvs. and small *fls.* crowded *in dense* or interrupted *terminal spike-like panicles*; calyx tubular-bell-shaped, 15–nerved; *corolla 2–lipped*; *stamens* 4, *exserted, the upper pr. longer than the lower*; anthers 2–celled, the cells parallel; ovary deeply 4–parted: nutlets ovoid, smooth. About 8 species, North America and one in eastern Asia. (Greek meaning "many spikes".)

1. **Agastache rugosa** Ktze. 排香草 (P'ai Hsiang Ts'ao; Ranked-aromatic Herb) (Sun 21). Aromatic herb, to 1 m.; fls. purplish or white, IX; lvs. pellucid-punctate. Eastern Asia; locally in An., Che., Ku., Hup. Cultivated, medicinal.

7. **Glechoma** Linn. Ground Ivy 連錢草属 (Lien Ch'ien Ts'ao Shu)

Creeping or decumbent herbs with long-petiolate orbicular or reniform crenate lvs. and rather large blue or violet *fls. in loose axillary clusters*; calyx 15–nerved, 2–lipped; corolla tube exserted; *stamens* 4, ascending under the lip of the corolla, not exserted, *the upper pr. longer than the lower*; anther cells divergent at right angles; style short: nutlets smooth. 6 species, in Eurasia; one in China. (The Greek name for thyme or pennyroyal.)

1. **Glechoma hederacea** Linn. (*Nepeta glechoma* Benth.; *N. hederacea* (L.) Trev.) 連錢草 (Lien Ch'ien Ts'ao; Connected-coin Herb) (G.M.1224). Creeping perennial; fls. bluish purple, III–IV. Eastern Asia, North America; locally in An., Che., Hun., Hup., Ki., Ku. Moist places. Fig. 321.

8. **Phlomis** Linn. Jerusalem Sage 耶路撒冷草属 (Yeh Lu Sa Lêng Ts'ao Shu)

Tall perennial herbs or shrubs with rugose lvs. and yellow, purple or white fls. in dense many-fld. axillary bracteate clusters: *calyx equally* toothed, 5–10–nerved, *open in fr.*; *stamens* 4, *the upper pr. shorter*; filaments not bifid; *style lobes unequal, the upper shorter*: nutlets ovoid. 50 species, in the eastern hemisphere; 10 in China. (An old Greek name of a woolly plant.)

1. **Phlomis dentosa** Franch. 陰地耶路撒冷草 (Yin Ti Yeh Lu Sa Lêng Ts'ao) (Sun 26). Erect herb, to 1.2 m.; fls. IX–X. China; locally in Ku. Woodland shade.

9. **Lamium** Linn. Dead Nettle 續断属 (Hsü Tuan Shu)

Brg. and more or less decumbent herbs with *crenate* dentate *or serrate* usually cordate *lvs.* and fls. in axillary or terminal lfy. bracteate clusters; *calyx* 5–nerved; the *teeth not spiny*; corolla sometimes ringed inside, the upper lip arched; *stamens* 4; anthers 2–celled, ovate; style lobes equal or nearly so: *nutlets* 3–*angled, truncate at the apex*. 40 species, in the eastern hemisphere; 3 in China. (From the Greek term

meaning "throat", referring to the ringed corolla.)

KEY TO THE SPECIES

Tube of corolla long-exserted from the calyx: plants glabrous or pubescent.
Lvs. petiolate, ovate, cordate: fls. white ..... 1. *L. album*
Lvs. sessile and clasping the stem: fls. red..... 2. *L. amplexicaule*
Tube of corolla only slightly, if at all, exserted from the calyx: lvs. petiolate; the lower ovate-lanceolate; the upper lanceolate: plant densely villose ..... 3. *L. chinense*

1. **Lamium album** Linn. 續斷 (Hsü Tuan; to Splice) (G.M.1230). Erect perennial, to 0.8 m.; fls. white, IV–V. Eurasia, Africa; locally in An., Che., Hun., Hup., Ki., Ku. Moist shade.
2. **Lamium amplexicaule** Linn. 佛座草 (Fo Tso Ts'ao; Buddha's-shrine Herb) (G.M. 1229). Erect annual, to 4 dm.; fls. purplish red, III–IV. Eastern Asia; locally in Che., Hup., Ki., Ku. Roadsides.
3. **Lamium chinense** Benth. (DC.P.12:512). Erect herb, 2–4 dm. high. Japan, Formosa, China; locally in Che., Hup., Ki. Woodland.

10. **Leonurus** Linn. MOTHERWORT 茺蔚屬 (Ch'ung Wei Shu)

Stout erect herbs with palmately incised or dentate lvs. and small white or pink fls. in dense axillary clusters; *calyx* 5-nerved; the *teeth spiny*; *upper lip of the corolla* densely white-woolly-hairy; *stamens* 4; anthers 2-celled, ovate; *style lobes equal* or nearly so: *nutlets* 3-*angled*, *truncate at the apex*, smooth. 10 species, in Eurasia; 2 in China. (From the Greek terms meaning "a lion's tail".)

KEY TO THE SPECIES

Lvs. few-lobed or entire: fls. 1.5–2 cm. long; upper lip of the corolla notched ..... 1. *L. macranthus*
Lvs. deeply and sharply multicleft, usually with three main segments: fls. smaller; upper lip of the corolla entire ..... 2. *L. sibiricus*

1. **Leonurus macranthus** Maxim. 錾菜 (Tsan Ts'ai; Carved Herb) (Mak.F.175). Stout annual, to 1 m.; fls. pink or red, VIII–X. Northeastern Asia; locally in Hon., Hup., Ku. Roadsides.
2. **Leonurus sibiricus** Linn. 益母草 (I Mu Ts'ao) (M.F.412). Herb, to 1.8 m.; fls. pink or red, V–IX. Eastern Asia, North America; locally in An., Che., Ki., Hup., Ku. Roadsides. Fig. 322.

11. **Stachys** Linn. HEDGE NETTLE 水蘇屬 (Shui Su Shu)

Herbs or subshrubs with crenate or serrate lvs. and fls. in terminal or axillary spikes or racemes; *calyx* 5–10-nerved, *with* 5 *nearly equal sharply pointed teeth*; corolla usually with a ring of hairs inside; *stamens* 4, *the upper pr. shorter*; *style lobes equal* or nearly so: *nutlets ovoid*, *with rounded apex*. 160 species, in north temperate regions; 5 in China. (From the Greek term meaning "a spike".)

KEY TO THE SPECIES

Lf. blades ovate, acute or acuminate, petiolate, 3–5 × 1.8–3 cm., pilose;

stems glandular-pilose calyx segments acute ..... 1. *S. arrecta*
Lf. blades oblong-lanceolate, sessile or short-petiolate: calyx segments spinescent.
Stems with downward-directed needle-pointed hairs on the angles, sometimes nearly glabrous: leaf-blades glabrescent, nearly sessile above, short-petiolate below ..... 2. *S. chinensis*
Stems with long spreading hairs: leaf blades sessile or nearly so, villose ..... 3. *S. oblongifolia*

1. **Stachys arrecta** Bailey (B.G.1:43). Erect herb, 2–6 dm. high; fls. purple, V–VI; fr. VI–VIII. China; locally in Hon., Hun., Hup. Brushland, woodland.
2. **Stachys chinensis** Bunge ex Benth. (*S. aspera* of F. & H. of Dunn, non Michx.) Woundwort 澤水蘇 (Tse Shui Su) (DC.P.12:471; Kudo 187). Erect perennial, to 0.8 m.; fls. pink, red, or purple, IV–VII. China; locally in Che., Ku.
3. **Stachys oblongifolia** Benth. (Sun 34). Erect perennial, to 1 m.; fls. pink or purplish, V–VI; fr. VI–VIII. Eastern Asia; locally in An., Hup., Ki., Ku. Moist places.

12. **Plectranthus** L'Herit. 香茶菜屬 (Hsiang Ch'a Ts'ai Shu; Aromatic-tea Herb Genus)

Tall herbs or small shrubs usually with small fls. in lax paniculately arranged 6–8-fld. clusters; calyx 5-toothed, 2-lipped, enlarged in fr.; *corolla 2-lipped*; the tube exserted; *the lower lip longer than the upper, boat-shaped*; *upper lip short, broad, recurved*, 3-4-fid; *stamens* 4, declining against the lower lip of the corolla; filaments free; anthers 1-celled; style 2-fid: nutlets various. About 90 species, in the tropical and subtropical parts of the eastern hemisphere; 25 in China. (Greek: *plektron*, spur, and *anthos*, flower.)

Key to the Species

a. Lf. blades orbicular to lanceolate-ovate; apex tipped with a long cusp which is often deeply sunken in the blade, and is sometimes constricted at the basal point of attachment: upper flg. bracts linear-subulate, minute ..... 1. *P. excisus*
aa. Lf. blades ovate to lanceolate; apex not tipped with a long cusp: flg. bracts lanceolate.
Frtg. calyx with deltoid triangular teeth.
Style and stamens usually more or less included in the extended lower lip of the corolla: lvs. mostly lanceolate 2. *P. amethystoides*
Style and stamens free and long-exserted from the corolla: lvs. mostly broadly ovate..... 3. *P. glaucocalyx*
Frtg. calyx with long-lanceolate acute teeth ..... 4. *P. nervosus*

1. **Plectranthus excisus** Maxim. 龜葉草 (Kuei Yeh Ts'ao; Tortoise-leaf Herb) (Sun 59). Herb or shrub, to 1.5 m.; fls. pale purple-violet, IX–X. China, Korea; locally in Hup., Ku. Woodland shade.
2. **Plectranthus amethystoides** Benth. (DC.P.12:61). Brg. herb, to 2 m.; fls. white, or pale purple, IX–X; fr. XI. China; locally in Che., Ki. Thickets, meadows.
3. **Plectranthus glaucocalyx** Maxim. (Max.F.212). Brg. herb, 1–2 m. high; fls. pale violet-lilac, IX–X; fr. XI. China, Japan, Korea; locally in Ku. Thickets, meadows.
4. **Plectranthus nervosus** Hemsl. (Sun 61). Perennial, to 1.6 m.; fls. IX–X. China; locally in Hup., Ku. Brushland, meadows. Fig. 323.

There are almost surely several other valid species of *Plectranthus* in the Lower Yangtze Valley, but more material and further study will be required to place them. Recent progress in naming species of this genus in China is indicated by contrasting the following references:

(a) Forbes and Hemsley, in 1890, listed 18 species (F.H.E. 2: 269–276).

(b) Dunn, in 1915, keyed and listed 33 species (Ed. N. 6 (28): 136–144).

(c) Handel-Mazzetti, in 1940, keyed and listed 60 species (Go. A. 13 (Pl. Sin. 39): 362–380).

13. **Salvia** Linn. Sage 鼠尾草属 (Shu Wei Ts'ao Shu)

Herbs or shrubs with mostly showy fls. in spiked racemed or panicled whorls; *calyx 2-lipped*; corolla strongly 2-lipped, the upper lip often arched; anther-bearing *stamens* 2; *anthers* 1-*celled*, *linear*; style 2-fid: nutlets 3-angled, smooth. 500 species, in temperate and tropical regions; 20 in China. (Latin: *salvare*, to save; referring to the reputed healing qualities of Sage.)

Key to the Species

a. Fls. over 2 cm. long: upper lip of the corolla falcate.
  Calyx and corolla scarlet: lvs. simple, glabrous ..... 1. *S. splendens*
  Calyx and corolla purplish: lvs. pinnate, pubescent ..... 2. *S. miltiorrhiza*
aa. Fls. 1.5 cm. long or less; upper lip of the corolla not falcate.
  b. Calyx white or bluish purple, densely tomentose ..... 3. *S. farinacea*
  bb. Calyx green or reddish purple, pubescent and more or less glandular.
    c. Fls. larger, 1 cm. or more long; calyx 5–7 mm. long: lvs. stems and calyces often red or purplish.
      Lvs. simple or some of the lower occasionally 3-foliolate; blades ovate or oblong, crenate, obtuse, truncate or cordate at base ..... 4. *S. chinensis*
      Lvs. pinnate, mostly trifoliolate: blades lanceolate or ovate, often cuneate at base and acute at tip ..... 5. *S. japonica*
    cc. Fls. smaller, 5–7 mm. long; calyx 2–3 mm. long: lvs. simple, oblong to ovate: lvs., stems and calyces green ..... 6. *S. plebeia*

1. **Salvia splendens** Sello ex Nees Scarlet Sage 一串紅 (I Ch'uan Hung; A-string-of red) (B.M.858). Shrub, to 1 m.; fls. scarlet. Introduced from Brazil; locally in An., Ku. Planted, ornamental.
2. **Salvia miltiorrhiza** Bunge 丹参 (Tan Shên; Red Ginseng) (Sun 37). Erect perennial, to 0.8 m.; fls. bluish purple, IV–VI. China, Japan; locally in An., Che., Hon., Hun., Hup., Ki., Ku. Grassland.
3. **Salvia farinacea** Benth. (B.M.858). Perennial, to 1 m.; fls. violet blue, V. Introduced from Texas; locally in Ku. Planted, ornamental.
4. **Salvia chinensis** Benth. (Sun 39). Erect herb, 3–5 dm. high; fls. purple, VI–X. China; locally in An., Hun., Ki., Ku. Grassland, brushland.
5. **Salvia japonica** Thunb. 鼠尾草 (Shu Wei Ts'ao; Rat-tail Herb) (Mak.F.171). Herb, to 0.7 m.; fls. bluish purple, VI–X. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Grassland.
6. **Salvia plebeia** R. Br. 雪見草 (Hsueh Chien Ts'ao; Seeing-snow Herb) (Sun 38). Erect herb, to 1 m.; fls. purple or bluish, V–X. Eastern Asia, Australia; locally in An., Che., Hun., Ki., Ku. Grassland.

14. **Lycopus** Linn. Water Horehound 地瓜兜苗属 (Ti Kua Êrh Miao Shu)

Perennial mostly stoloniferous marsh herbs with simple erect stems, dentate or

pinnatifid sharply serrate or incised lvs. and small white or purple fls. in dense axillary whorls; calyx with 4–5 nearly equal teeth; *corolla almost equally* 4-*cleft*; *fertile stamens* 2, *on the lower side of the corolla tube*; *staminodes* 2, *on the upper side*: nutlets smooth, the top truncate. About 15 species, in north temperate regions; one in China. (From the Greek terms meaning "a wolf" and "foot", referring to the form of the lvs.)

1. **Lycopus lucidus** Turcz. 地瓜兜苗 (Ti Kua Êrh Miao; Ground-melon Seedling) (Mak.F.168). Erect stoloniferous herb, to 1.2 m.; fls. white, VIII–X; lvs. sharply serrate. Eastern Asia; locally in Ki., Ku. Damp meadows.

Lycopus europaeus Linn. has been listed from our area (F.H.E. 2: 282). This species is described by Bentham as without stolons, "stolonibus nullis" (Benth. Lab. 186; DC.P. 12: 178). It is named by Hooker from India (H.F. 4: 648), but is described with "rootstock creeping or stoloniferous". Kudo (p. 85) has reduced Miquel's *L. europaeus* from Japan to a variety of *L. lucidus*. All the forms of *Lycopus* known to the writer from China have stolons, and the stolons, often bear tuberous rhizomes, as in Henry No. 4599 in the Gray Herbarium.

15. **Mosla** Buch.-Ham. 薷属 (Chi Ning Shu; Green-vegetation Genus)

Branching aromatic annuals with slender stems, opposite lvs. and fls. in terminal or axillary secund racemose 2-fld. whorls; calyx bell-shaped, enlarged in fr., gibbous at the base; the throat hairy; *corolla slightly* 2-*lipped*: *stamens* 2, inserted *on the upper side of the corolla tube*; *staminodes* 2, *on the lower side*; anther cells 2: nutlets globose. About 10 species, in eastern Asia; most of them found in China. (The Nepalese name of *M. nepalensis*.)

Key to the Species

a. Infl. compact, capitate; bracts large and imbricate ..... 1. *M. chinensis*
aa. Infl. an interrupted raceme; bracts shorter than the corolla.
b. Nutlets sparsely and irregularly netted with thread-like reticulations.
Corolla not annulate; upper calyx teeth acute ..... 2. *M. dianthera*
Corolla annulate: lvs. linear-lanceolate, loosely serrate with sharp forward-pointing teeth ..... 3. *M. remotiflora*
bb. Nutlets closely, regularly and deeply reticulate-sculptured: upper calyx teeth obtuse.
Corolla tube naked inside; bracts of the infl. lanceolate..... 4. *M. lanceolata*
Corolla tube with a ring of hairs inside, annulate; bracts of the infl. ovate-acuminate ..... 5. *M. punctata*

1. **Mosla chinensis** Maxim. (Sun 53). Slender sometimes brg. annual, to 4 dm.; fls. pink or reddish, IX. China; locally in An., Che., Hun., Hup., Ki., Ku. Moist shady places.
2. **Mosla dianthera** (Roxb.) Maxim. (H.F.4:647). Slender brg. herb, to 8 dm.; fls. pink, VIII–IX; pedicels shorter than the frtg. calyx. Eastern Asia; locally in Hun., Hup., Ki. Grassland. Fig. 324.
3. **Mosla remotiflora** Sun (Sun 55). Annual, to 0.8 m.; fls. pink or pale purple, IX. China; locally in An., Ku. Moist shade.
4. **Mosla lanceolata** (Benth.) Maxim. (*Perilla lanceolata* Benth.) (Be.F.276). Erect brg. annual, 0.3–1 m. high; fls. purple, VIII–X. China; locally in Che., Hup., iK., Ku. Thickets, woodland.
5. **Mosla punctata** (Thunb.) Maxim. 石薷 (Shih Ch'i Ning) (Mak.F.166). Annual,

to 1.2 m.; fls. pink or red, VIII–IX. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Moist roadside.

16. **Satureja** Linn. Calamint 風輪菜屬 (Fêng Lun Ts'ai Shu)

Herbs (ours) or shrubs with purple or white fls. in terminal or axillary clusters; calyx 10-nerved, 2-lipped; *corolla somewhat 2-lipped*; *stamens* 4, *the upper sometimes sterile*; style 2-cleft at the top: *nutlets rounded at the top.* About 130 species, in north temperate countries; 5 in China. (The old Latin name.)

Key to the Species

a. Bracts of the infl. numerous, conspicuous, as long as the pedicels or longer; fls. many: robust herbs.
  Heads of the infl. few, large, 1.2–2.2 cm. in diam.: lvs. 2–4 cm. long: flg. bracts considerably longer than the pedicels.
    Flg. bracts extending to from one-half to nearly as long as the calyx: lvs. up to 4 cm. long ..... 1. *S. chinensis*
    Flg. bracts extending only to the lower half of the calyx: lvs. 2–3 cm. long..... 2. *S. umbrosa*
  Heads of the infl. numerous, small, 1.3–1.7 cm. in diam.: lvs. 1.3–2 cm. long: flg. bracts extending to the lower half of the calyx.. 3. *S. polycephala*
aa. Bracts of the infl. few, inconspicuous, shorter than the pedicels; fls. few: slender herbs ..... 4. *S. gracilis*

1. **Satureja chinensis** (Benth.) Briq. (*Calamintha chinensis* Benth.) 風輪菜 (Fêng Lun Ts'ai; Wind-vane Herb) (Sun 41). Aromatic perennial, to 0.7 m.; fls. pink or purplish red, VI–VIII. Eastern Asia; locally in An., Che., Hon., Hun., Hup., Ki., Ku. Woodland.
2. **Satureja umbrosa** (Bieb.) Scheele ex Briqu. (*Calamintha umbrosa* (Bieb.) Benth.) (H.F.4:650). Coarse decumbent herb; fls. pink or purple, VI–VIII. Eastern Asia; locally in Che., Hun., Hup., Ki., Ku. Grassland.
3. **Satureja polycephala** (Vaniot) Steward (*Calamintha polycephala* Vaniot) (Bu.G.B. 14:183). Erect herb, to 0.8 m.; fls. VIII. China; locally in An. Brushland.
4. **Satureja gracilis** (Benth.) Briq. (*Calamintha confinis* Hance) (Sun 42; Ed.N.6:158). Erect annual, to 3 dm.; fls. few, pink or purplish red, V–IX. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Moist shade.

17. **Mentha** Linn. Mint 薄荷屬 (Po Ho Shu)

Aromatic perennial herbs with creeping rootstocks, simple mostly punctate lvs. and small purple pink or white *fls.*; the *dense whorls in axillary* or often interrupted *terminal spikes*; calyx 10-nerved, about equally 5-toothed; *corolla nearly regular*, 4-*lobed*, the upper lobe slightly notched; *stamens* 4, *erect*, equal; *anthers* 2-celled, the *sacs parallel*; style shortly cleft: nutlets ovoid. About 30 species, in north temperate regions; 2 or more in China. (From the Greek name of the nymph *Minthe*, used for the plant by Theophrastus.)

Key to the Species

Whorls of fls. axillary, separated, subtended by normal lvs.; lvs. pubescent ..... 1. *M. arvensis*
Whorls of fls. terminal, crowded into a cylindric "spike", subtended by reduced lvs.; lv. glabrous ..... 2. *M. spicata*

1. **Mentha arvensis** Linn. Field Mint 薄荷 (Po Ho) (B.M.863). Aromatic perennial,

to 1 m.; fls. pink, purplish or white, X–XI. Eurasia, North America; locally in Che., Hup., Ki., Ku. Damp banks and cultivated, condiment. Fig. 325.

2. **Mentha spicata** Linn. Spearmint (B.M.863). Perennial, to 1.3 m.; fls. purplish white, VIII. Eurasia, North America; locally in Ku. Roadsides and cultivated.

18. **Origanum** Linn. Marjoram 小葉薄荷屬 (Hsiao Yeh Po Ho Shu)

Erect perennial herbs or subshrubs with rather small entire or dentate lvs. and purplish fls. in dense terminal cymose clusters, subtended by large ovate overlapping bracts; *floral whorls in regular racemes*; *calyx* 10–15-nerved, about *equally* 5-*toothed*, with hairy throat; *corolla slightly* 2-*lipped*; *stamens* 4, *exserted*; *anther cells diverging*: nutlets smooth. About 30 species, in the eastern hemisphere; one in China. (From the Greek terms meaning "a mountain" and "ornament".)

1. **Origanum vulgare** Linn. Wild Marjoram 小葉薄荷 (Hsiao Yeh Po Ho; Small-leaved Mentha) (G.M.1245). Perennial, to 5 dm.; fls. purplish, pink or white, VI–VIII. Eurasia; locally in An., Che., Hon., Hun., Hup., Ki., Ku. Grassland.

19. **Thymus** Linn. Thyme 麝香草屬 (Shê Hsiang Ts'ao Shu; Musk-herb Genus)

Low shrubs, often prostrate, with small entire strongly veined aromatic lvs.: fls. in terminal leafy or leafy-bracted clusters; *bracts* of the individual fls. *very small*, subulate; *calyx* 2-*lipped*, the lower lip deeply cut into 2 subulate ciliate segments; corolla somewhat 2-lipped; stamens 4; nutlets ovoid or oblong, smooth. About 50 species, chiefly of the Mediterranean region; one cultivated in China. (Greek: *thyein*, to burn perfume, because it was used for incense.)

1. **Thymus serpyllum** Linn. Mother-of-thyme (B.M.862). Fine-stemmed creeping shrub; fls. pink or purplish, VII–VIII. Introduced from northern Europe; locally in Ku. Cultivated, condiment.

20. **Dysophylla** Blume 水珍珠菜屬 (Shui Chên Chu Ts'ai Shu; Water Pearl Vegetable Genus)

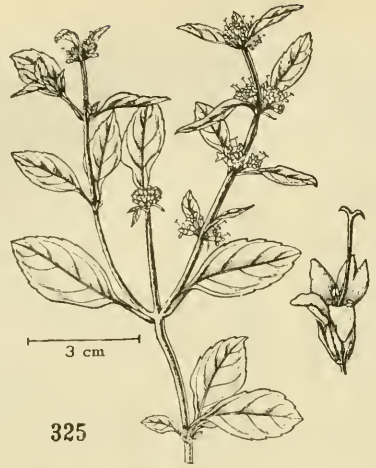
Erect herbs with opposite or *verticillate lvs.* and very small *fls.* crowded *into dense* cylindric terminal "*spikes*" which are made up of congested cymes; calyx and corolla minute, equally 5-toothed; stamens 4, exserted; filaments long and bearded; style 2-fid: nutlets ovoid or oblong. About 20 species, mostly in eastern Asia; 5 or 10 in China. (Greek: *dysodes*, foetid, and *phyllon*, leaf; in reference to the offensive smell of the leaves.)

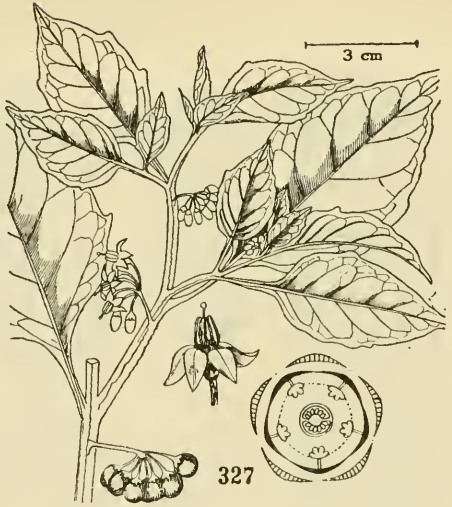
1. **Dysophylla verticillata** Benth. (H.F. 4: 639). Erect annual, 1–6 dm. high; fls. rose-colored, IX–X. Eastern Asia, Philippines, Australia; locally in Ki., Hun. Swampy ground.

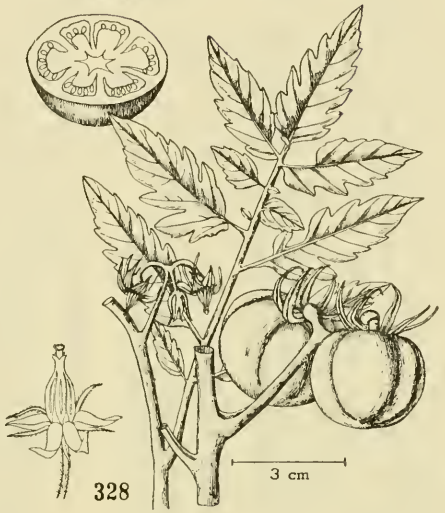
21. **Elsholtzia** Willd. 香薷屬 (Hsiang Ju Shu)

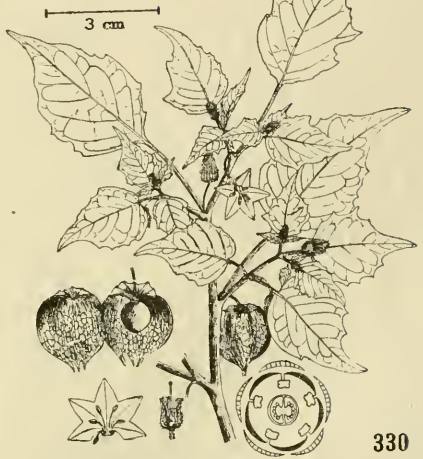
Herbs (ours) or subshrubs with thin petiolate opposite ovate or lanceolate lvs. and small fls.; *the whorls in* dense terminal bracteate *one-sided spikes*; *calyx* 10-nerved, with 5 equal teeth, the throat naked; *corolla slightly* 2-*lipped*; *stamens* 4, *erect*; anther cells diverging: nutlets tuberculate or nearly smooth. About 20 species, in eastern and central Asia; 8 in China. (For J. S. Elsholtz, 1623–1688, German physician and botanist.)

1. **Elsholtzia ciliata** (Thunb.) Hylander (*E. cristata* Willd.; *E. patrini* (Lepech.)









325. Mentha arvensis
326. Perilla frutescens

327. Solanum nigrum
328. Lycopersicon esculentum

329. Capsicum frutescens
330. Physalis alkekengi

Garke) 香薷 (Hsiang Ju; Aromatic Madder) (G.M.1250). Annual, to 5 dm.; fls. blue, IX–X. Asia; locally in An., Che., Hup., Ki., Ku. Grassland.

Handel-Mazzetti has separated *Elsholtzia angustifolia* (Loes.) Hand.-Mazz. and *E. argyi* Lévl. from *E. patrini* (Lepech.) Garke (=*E. ciliata* (Thunb.) Hylander) in his "Clavis analytica specierum sinensium" (Act. Hort. Gotob. 13 (Pl. Sin. 39): 355), saying that they have flowering bracts usually violet-colored and that the bracts are long-pilose all over, while in *E. patrini* the bracts are usually without color, and with the blade glabrous but with margin ciliate. The specimen collected by Fan and Li in Hunan (No. 614) cited by Handel-Mazzetti, fits well under *E. argyi*, but Henry No. 2852 from Hupeh, cited as *E. patrini*, and other specimens seen at the Gray Herbarium, have considerable pubescence on the blades of the flowering bracts, indicating that this character is not definite. Dunn (Ed. N. 6(28):151) has placed *E. argyi* as a synonym of *E. cristata* Willd. (=*E. ciliata*). The writer inclines towards this view or at most varietal status for *E. argyi* and *E. angustifolia*.

22. **Ocimum** Linn. 羅勒屬 (Lo Lo Shu)

Erect aromatic herbs or small shrubs with ovate lvs. and *whorls* of 3 small *fls.* in loosely panicled clusters: calyx deflexed in fr.; *corolla* 2-lipped; *the lower lip slightly longer than the upper, flat*; the tube not exserted; stamens exserted, declining; the lower filaments sometimes connate below: nutlets smooth or somewhat wrinkled. About 50 species, in warm countries, chiefly in Asia; 3 in China. (Greek: *okimon*, an aromatic plant, basil.)

1. **Ocimum basilicum** Linn. 羅勒 (Lo Lo; Engraved Net) (B.M.865). Aromatic annual, to 0.7 m.; fls. white or purplish, IX–X; lf. blades glabrescent, remotely serrate. Tropical Asia, Africa, Pacific Islands; locally in Ki., Ku. Planted, ornamental.

23. **Perilla** Linn. 紫蘇屬 (Tzŭ Su Shu)

Coarse aromatic erect annuals with opposite petiolate often purplish lvs. and small *fls. in loose terminal* bracteate *paniculate racemes*; calyx 10-nerved, 5-cleft, nearly regular in fl., enlarged and gibbous at the base in fr.; throat not bearded; *corolla* campanulate, *slightly oblique*; stamens 4, erect, about equal, scarcely exserted; anther cells parallel at first, later diverging: nutlets subglobose, coarsely reticulate. 2 or 3 species, in Asia; all found in China. (Said to be a native name in India.)

1. **Perilla frutescens** (L.) Britt. (*P. ocymoides* Linn.) 荏 (Jên; Pliant) (G.M.1251; Br. & B.3:154). Aromatic annual, to 1.5 m.; fls. white, IX–XI; lvs. blunt-dentate. Eastern Asia, North America; locally in An., Hun., Hup., Ki., Ku. Cultivated, oil. Fig. 326.

1a. **Perilla frutescens** (L.) Britt. var. **crispa** (Benth.) Deane (*P. ocymoides* Linn. var. *crispa* Benth.; *P. ocymoides* var. *nankinensis* (Lour.) Voss; *P. nankinensis* (Lour.) Decne.) 紫蘇 (Tzŭ Su; Reviving Purple) (B.M.864). Fls. white, red or pink; frtg. infl. purple; lvs. laciniate-dentate. China; locally in An., Che., Ki., Ku.

Handel-Mazzetti made a new combination for this name, *P. frutescens* (L.) Britt. var. *crispa* (Thunb.) Hand.-Mazz. in A.H.G. 13 (Pl. Sin. 39): 352, based on *Ocimum crispus* Thunb. (1784). Though based on an earlier name than Bentham's var. *crispa* (1848), the combination is not valid because Bentham's name was previously applied to this plant in the variety category.

152. **SOLANACEAE** Nightshade Family 茄科 (Ch'ieh K'o)

Herbs or shrubs, sometimes climbing, or small trees with usually alternate estipu-

late lvs. and perfect regular 5-merous cymose fls.; *corolla valvate or plicate* in the bud; fertile stamens 5 (or 4), sometimes joined together by their anthers; *ovary 2-celled, sometimes appearing 4-celled* because of a false septum: *fr. a berry or capsule*: contains many poisonous plants. 85 genera with over 2,200 species, in tropical and temperate regions; 10 genera and 60 species in China.

Key to the Genera

A. Fr. a fleshy or leathery berry.
  B. Plants herbaceous (some *Capsicum* are woody at the base).
    C. Frtg. calyx not bladdery or much inflated.
      Fr. a fleshy berry.
        Lvs. simple (except *S. tuberosum*); margins entire, lobed or cleft: anthers opening mostly near the tip ..... 1. *Solanum*
        Lvs. pinnately compound: anthers opening from top to bottom ..... 2. *Lycopersicon*
      Fr. a leathery berry, not fleshy within ..... 3. *Capsicum*
    CC. Frtg. calyx bladdery, inflated in fr. ..... 4. *Physalis*
  BB. Plants shrubby (most *Capsicum* are herbaceous).
    D. Plants thorny ..... 5. *Lycium*
    DD. Plants without thorns.
      Corolla rotate or shallowly campanulate.
        Fr. a leathery berry, not fleshy or pulpy..... 3. *Capsicum*
        Fr. a fleshy or pulpy berry ..... 1. *Solanum*
      Corolla salverform, with a long tube: fr. a small berry, scarcely fleshy..... 6. *Cestrum*
AA. Fr. a capsule.
  E. Capsule prickly or spiny: fls. very large, 10–15 cm. long ..... 7. *Datura*
  EE. Capsule smooth: fls. smaller, up to 5 cm. long.
    Stamens equal, not in prs.: lvs. large, up to 3 dm. long ..... 8. *Nicotiana*
    Stamens unequal, 4 of them in prs., the 5th smaller: lvs. smaller, not over 3 cm. long.
      Stamens attached at the top of the corolla tube ..... 9. *Nierembergia*
      Stamens attached at the middle of the corolla tube..... 10. *Petunia*

1. **Solanum** Linn. Nightshade 茄屬 (Ch'ieh Shu)

Herbs or shrubs, often climbing, sometimes trees, occasionally spiny, often stellate-pubescent, with *simple* or compound *lvs.*: corolla rotate or shallowly campanulate; stamens 4, the *anthers united into a cone, opening mostly near the tip*: *fr. a fleshy berry*: one of the largest of plant genera. 1200 species, tropical and subtropical regions; 15 in China. (An old Latin name, probably from *solari*, to quiet; referring to medicinal properties.)

Key to the Species

a. Lvs. simple: plants without fleshy stem tubers.
  b. Plants armed.
    Plants armed with straight bristles.
      Fr. glabrous: lvs. and stems hairy when young, becoming glabrous, except for spines, at maturity .. 1. *S. aculeatissimum*
      Fr., stems and lvs. brown-tomentose: spines fewer and shorter than in the preceding species..... 2. *S. ferox*
    Plants armed with more or less recurved prickles on stems.

petioles and veins of the lvs. ..... 6. *S. melongena*

bb. Plants unarmed.

c. Climbing vines.

Fls. in clusters.

Plants not conspicuously pubescent, often glabrescent: lf. blades entire or with wavy margins.. 3. *S. dulcamara*

Plants conspicuously pubescent on stems and lvs.: lf. blades, at least the upper ones, lyrately lobed ..... 4. *S. lyratum*

Fls. solitary in the leaf axils: plant not conspicuously pubescent: leaf blades glaucous beneath, not lobed ..... 5. *S. lysimachioides*

cc. Bushy plants.

d. Lvs. large; blades 8–16 cm. long: fr. ovoid, oblong or obovoid, 10–15 cm. long: fls. violet, 2–4 cm. long ..... 6. *S. melongena*

dd. Lvs. small; blades 2–8 cm. long: fr. globular, 1–1.5 cm. in diam.: fls. white, not over 1 cm. long.

Fr. black: lvs. mostly ovate ..... 7. *S. nigrum*

Fr. red or yellow: lvs. narrow-oblong to oblanceolate.

Twigs stellate-pubescent ..... 8. *S. capsicastrum*

Twigs glabrous ..... 9. *S. pseudo-capsicum*

aa. Lvs. pinnately compound: plants producing fleshy stem tubers 10. *S. tuberosum*

1. **Solanum aculeatissimum** Jacq. 芳茄 (Lê Chia) (H.F.4:237). Bushy herb, to 1 m.; fls. white, VII–XI; fr. red, X–XI, glabrous. Tropical Asia; locally in Hun., Ki., Ku. Planted, ornamental.
2. **Solanum ferox** Linn. (Be.F.243). Bushy biennial; or perennial; fls. IX–XI; fr. X–XI, hairy. Tropical Asia; locally in Ku. Planted, ornamental.
3. **Solanum dulcamara** Linn. Bittersweet (G.M.1253). Perennial vine; fls. blue, purple, white, VII–IX; fr. red, IX–X. Eurasia, North America; locally in An., Hun., Hup., Ki., Ku. Woodland.
4. **Solanum lyratum** Thunb. 蜀羊泉 (Shu Yang Chüan) (DC.P.13(1):79). Perennial vine; fls. purple, VII–IX; fr. red, IX–X. Japan, China; locally in Hun., Hup., Ki., Ku. Thickets.
5. **Solanum lysimachioides** Wall. (DC.P.13(1):181). Slender-stemmed perennial vine; fls. solitary, purple or white, VI–VIII; fr. VIII–IX. India, China; locally in Hun., Hup. Woodland, streamside.
6. **Solanum melongena** Linn. Egg Plant 茄 (Ch'ieh) (H.F.4:235). Erect perennial, to 1 m.; fls. violet, VII–IX; fr. large (10–15 cm. long), purple, white, VIII–X. Introduced from southern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, vegetable.

There is great variety in the degree of hairiness and in the abundance or absence of bristles in this species. The var. *esculentum* Nees (B.M. 869) is commonly cultivated in our area.

7. **Solanum nigrum** Linn. Nightshade 龍葵 (Lung K'uei; Dragon Mallow) (G.M.1253). Bushy herb, to 1 m.; fls. white, VI–X; fr. black, VIII–X. World wide; locally in An., Hup., Ki., Ku. Roadsides. Certain forms of this species are cultivated for

their large edible berries, e.g. Wonderberry (B.M.868). Unripe fruits and leaves of these plants may be poisonous. Fig. 327.

8. **Solanum capsicastrum** Link (B.M.868). Bushy shrub, to 1.3 m.; fls. white, V–VI; fr. scarlet to orange-red, VII–IX. Introduced from South America; locally in An., Che., Ki., Ku. Planted, ornamental.
9. **Solanum pseudo-capsicum** Linn. Jerusalem Cherry 玉珊瑚 (Yü San Hu; Jade Coral) (B.M.868). Bushy shrub, to 1.3 m.; fls. white, VI–VIII; fr. red, yellow, VII–X. Old World; locally in An., Che., Ki., Ku. Planted, ornamental.
10. **Solanum tuberosum** Linn. Potato 馬鈴薯 (Ma Ling Shu; Horse-bell Tuber) 洋芋 (Yang Yü; Foreign Potato) (B.M.868). Bushy herb, to 1 m.; fls. white, VI–VIII; fr. yellowish or green. Introduced from temperate regions in the Andes; locally in An., Che., Hun., Hup., Ku. Cultivated, tubers.

2. **Lycopersicon** Mill. Tomato 六月柿屬 (Liu Yüeh Shih Shu; Sixth-month-persimmon Genus)

Coarse rank herbs, differing from *Solanum* in being always unarmed, and in having *pinnate* or pinnatifid *lvs.*, and especially in the *anthers*, which have sterile tips, and *open from top to bottom*; fls. 5–6-merous, yellow; sepals spreading, acuminate: fr. a fleshy 2–several-celled berry. 12 species, in South America; one cultivated in China. (Greek: *lycos*, wolf, and *persicon*, peach.)

1. **Lycopersicon esculentum** Mill. 番茄 (Fan Ch'ieh) (B.M.869). Perennial, to 2 m.; fls. yellow, VI–IX; fr. red, yellow, VII–X. Introduced from western South America; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, fruit. Fig. 328.

3. **Capsicum** Linn. Red Pepper 番椒屬 (Fan Chiao Shu; Aborigines'-pepper Genus)

Erect glabrous herbs (under cultivation) or shrubs with simple entire lvs., white or violet-tinged fls. in 2's or 3's or solitary; corolla rotate; *anthers free*; ovary 2–3-celled: *fr. an* oblong, lanceolate or ovoid *leathery* many-seeded *berry, not fleshy, pungent to the taste.* Species one or many, according to the interpretation, all American, one cultivated in China. (Latin: *capsa*, box, chest; referring to the shape of the fr. in some forms.)

1. **Capsicum frutescens** Linn. 辣椒 (La Chiao; Pungent Pepper) (B.M.873). Shrub, to 2 m.; fls. greenish white, VII–VIII; fr. VIII–X, a leathery berry. Introduced from Central and South America; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, fruit. Fig. 329.

4. **Physalis** Linn. Ground Cherry 酸漿屬 (Suan Chiang Shu)

Spreading herbs with simple lvs. and axillary solitary fls.; *calyx inflated, enclosing but free from the fr.*; corolla yellow or purple; *anthers separate, opening lengthwise*: fr. a globular fleshy berry. 75 species, mostly in the Americas; 4 in China. (From the Greek term meaning "bladder", referring to the inflated calyx.)

Key to the Species

Calyx red in fr.: plant glabrous; stems simple; lf. blades 6–12 cm. long; fls. 15 mm. across ..... 1. *P. alkekengi*

Calyx green in fr.: plant pubescent: stems branched: lf. blades 3–6 cm. long: fls. 10 mm. across ..... 2. *P. minima*

1. **Physalis alkekengi** Linn. Chinese Lantern Plant 酸醬 (Suan Chiang; Sour Relish) (B.M.871). Glabrous perennial, to 0.7 m.; fls. whitish, VI–VII; fr. red, VII–IX. Eurasia; locally in An., Hun., Hup., Ku. Cultivated, ornamental. Fig. 330.
2. **Physalis minima** Linn. 天泡菓 (T'ien P'ao Kuo; Natural-bubble Fruit) (M.F.419). Pubescent annual, to 0.6 m.; fls. yellow, VII–VIII; fr. green, VIII–IX. Tropical America, Asia, Africa; locally in An., Hup., Ki., Ku. Waste land.

5. **Lycium** Linn. Box Thorn 枸杞屬 (Kou Ch'i Shu)

Shrubby plants, often *spiny*, sometimes climbing, with simple narrow entire lvs. and small axillary fls.; *stamens exserted*, with a bearded ring near the base of the filament; anthers opening lengthwise: fr. a small berry. 100 species, temperate or subtropical regions; 3 in China. (Greek: *lykion*, an old Greek name for a thorny shrub.)

1. **Lycium chinense** Mill. Chinese Matrimony Vine 枸杞 (Kou Ch'i; Thorny Willow) (R.M.813). Rambling thorny shrub; fls. purple, VI–IX; fr. red, VIII–X. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Brushy places. Fig. 331.

6. **Cestrum** Linn. 墨枸杞屬 (Mê Kou Ch'i Shu)

Unarmed shrubs or small trees with simple entire lvs. and cymose fls.; corolla with a long slender tube; *stamens included*: fr. a small berry, sometimes scarcely fleshy. 150 species, in tropical and subtropical America; one or more cultivated in China. (Greek: *kestron*, a plant name.)

1. **Cestrum purpureum** (Lindl.) Standl. (*C. elegans* Schlecht.) (B.M.873). Bush; fls. salver-form, red-purple, V; fr. red. Introduced from Mexico; locally in Ku. Planted, ornamental.

7. **Datura** Linn. Jamestown Weed 曼陀羅花屬 (Man T'o Lo Hua Shu)

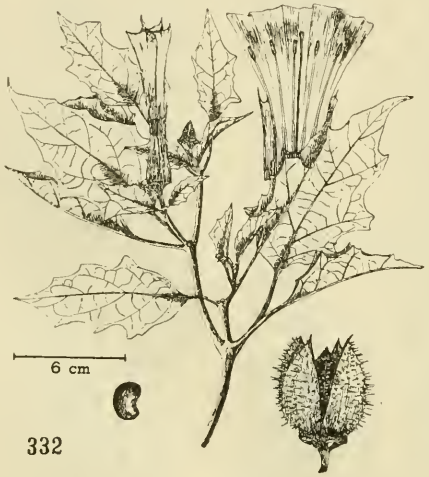
Coarse strong-smelling herbs (ours), shrubs or trees with *large simple lvs.* and very *large* axillary solitary *trumpet-shaped* white or purple *fls.*; corolla plaited, short-lobed: *fr. a prickly capsule* with numerous compressed seeds. 15 species, in warm countries; 2 or more in China. (The local East Indian name.)

1. **Datura metel** Linn. 曼陀羅 (Man T'o Lo) (B.M.877). Annual, to 2 m.; fls. white, tinged violet, VI–X; fr. a large prickly capsule, IX–XI. Introduced from India; locally in An., Ku. Waste ground. Fig. 332.

8. **Nicotiana** Linn. Tobacco 烟草屬 (Yen Ts'ao Shu)

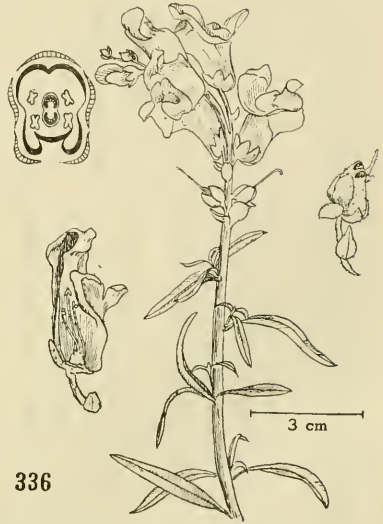
Coarse strong-scented erect viscid pubescent herbs (ours), shrubs or trees with *large simple lvs.* and night-opening fragrant fls. in terminal panicles or racemes; *stamens* 5, *equal*: *fr. a smooth capsule* with numerous minute seeds. 50 species, in North and Central America, the Pacific Islands and Australia; one cultivated in China. (After Jean Nicot, 1530–1600, French Consul to Portugal, who is said to have presented tobacco to the courts of Portugal and France.)

1. **Nicotiana tabacum** Linn. Tobacco 烟草 (Yen Ts'ao; Smoke Herb) (B.M.875). Annual, sometimes perennial, to 2 m.; fls. white, rose-pink, IX–X; lvs. large, up



331. Lycium chinense
332. Datura metel

333. Nicotiana tabacum
334. Veronica didyma



335. Lindernia crustacea
336. Antirrhinum majus

to 3 dm. long. Introduced from tropical America; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, leaves. Fig. 333.

9. **Nierembergia** Ruiz & Pav. Cup Flower 賽亜麻属 (Sai Ya Ma Shu)

Low shrubs and perennial herbs with simple entire lvs. and white or pale violet solitary terminal or subterminal fls.; *stamens attached at the top of the corolla tube*, 4 *of them in two equal pairs, the fifth smaller*: fr. a 2-valved capsule. 25 species, tropical and subtropical America; one or more cultivated in China. (After John Eusebius Nieremberg, about 1595–1658, a Spanish Jesuit, and the first professor of natural history at Madrid.)

1. **Nierembergia frutescens** Dur. Tall Cup Flower 賽亜麻 (Sai Ya Ma) (B.M.878). Perennial, to 1 m.; fls. white, tinged lilac or blue, IX; plant woody at base. Introduced from Chili; locally in Ku. Planted, ornamental.

10. **Petunia** Juss. 撞羽朝顔属 (Chuang Yü Chao Yen Shu)

Straggling viscid-pubescent herbs with alternate (or the upper opposite) simple entire lvs. and white or purple solitary fls.; *stamens attached at the middle of the corolla tube, unequal*, 4 *of them in two equal pairs, the fifth smaller* or rudimentary: fr. a 2-valved many-seeded capsule. 12 species, in southern South America; one or more cultivated in China. (A South American aboriginal name.)

1. **Petunia violacea** Lindl. Violet-flowered Petunia 撞羽朝顔 (Chuang Yü Chao Yen; Touched-with-wings-of-morning-color) (B.M.879). Decumbent annual; fls. rose-red, violet, V–X. Introduced from Argentina; locally in An., Che., Ki., Ku. Planted, ornamental.

153. **SCROPHULARIACEAE** Figwort Family 玄参科 (Hsüan Shên K'o)

Herbs, shrubs or trees with simple alternate, opposite or whorled estipulate lvs. and perfect *irregular* 4–5-merous *fls.*; corolla usually 2-lipped; *stamens* 2, 4 or 5, *usually* 4, *didynamous, inserted on the corolla tube*; *ovary superior*: fr. a 2-celled many-seeded capsule. 180 genera with 3,000 species, in all parts of the world; 48 genera and over 500 species in China.

Additions and corrections to the treatment of *Scrophulariaceae* have been contributed by Dr. Hui-lin Li.

Key to the Genera

A. Plants herbaceous.
  B. Stamens 2: corolla with spreading lobes, not 2-lipped ..... 1. *Veronica*
  BB. Stamens 4, or a 5th sterile one sometimes present.
    C. Lvs. opposite, or the upper ones alternate.
      D. Plants not darkened to an unusual degree in drying.
        E. Calyx not broadly winged.
          F. Lvs. entire or serrate.
            G. Lvs. entire (in ours).
              H. Calyx spathe-like ..... 2. *Centranthera*
              HH. Calyx 5-cleft or -parted.
                Calyx lobes enlarged in fr. to about 1 cm. in length, with a tube

about equal to the lobes .... 3. *Monochasma*
Calyx lobes not enlarged in fr., very short, or the calyx cleft to the base.
Fls. small, not over 5 mm. in diam. .... 4. *Lindernia*
Fls. large, up to 20 mm. in diam. 5. *Antirrhinum*
GG. Lvs. serrate or crenate.
Erect plants with square stems, 0.5–1 m. tall .... 6. *Scrophularia*
Decumbent or ascending plants, 0.1–0.3 m. tall .... 7. *Mazus*
FF. Lvs. pinnately cleft: plants viscid-pubescent 8. *Phtheirospermum*
EE. Calyx with 3–5 broad wings .... 9. *Torenia*
DD. Plants turning black in drying.
Calyx tubular, conspicuously ribbed, 1–2 cm. long 10. *Siphonostegia*
Calyx not conspicuously tubular or ribbed; the uncleft portion not over 1 cm. long.
Seeds 4 or fewer in each capsule: stems slender, freely brg.: lvs. usually entire .... 11. *Melampyrum*
Seeds numerous: stems stout, sparsely brg.: lvs. usually serrate, cleft or divided .... 12. *Pedicularis*
CC. Lvs. alternate.
Fls. small, in axillary aments; calyx and corolla equally 4-cleft; stamens 2, exserted: stems wandering or prostrate .... 13. *Botryopleuron*
Fls. large, in terminal racemes on the main stem or branches; calyx and corolla 5-lobed or -cleft; stamens 4, included: stems erect, simple or brg.
Stems usually simple: plants glabrous, pubescent or lanate, not viscid: flg. racemes green-bracteate, but not leafy; calyx about equally cleft .... 14. *Digitalis*
Stems brg. from the base: plants viscous-villous: flg. racemes leafy; posterior segment of the calyx elongated .... 15. *Rehmannia*
AA. Plants woody, becoming trees .... 16. *Paulownia*

1. **Veronica** Linn. Speedwell 水苦賈属 (Shui K'u Mai Shu)

Herbs (ours), shrubs or small trees, with opposite (rarely alternate or whorled) lvs. and terminal or axillary, racemose or solitary fls.; *corolla with spreading lobes, not 2-lipped*; *stamens* 2, exserted: capsule compressed, 2-grooved. 250 species, in temperate and cold regions; over 30 in China. (Named for St. Veronica.)

Key to the Species

a. Stems, or some of them, prostrate: fls. axillary.
Pedicels shorter than sepals: seeds many: plant erect at first, becoming diffuse .... 1. *V. arvensis*
Pedicels longer than sepals: seeds few: plants repent.
Fls. not over 5 mm. in diam., pink: capsules bi-globose, turgid 2. *V. didyma*
Fls. about 10 mm. in diam., blue with white center: capsules flattened, notched .... 3. *V. persica*
aa. Stems erect,

Fls. axillary: plants pubescent ..... 1. *V. arvensis*
Infl. terminal.
Plant glabrous: stems stout: lvs. 5–10 cm. long; racemes laxly fld. ..... 4. *V. undulata*
Plant more or less pubescent: stems slender: lvs. 2–4 cm. long: racemes densely fld. ..... 5. *V. galactites*

1. **Veronica arvensis** Linn. (G.M.1284). Erect or reclining annual, 7–25 cm. high; fls. violet blue, IV–V. Introduced from Europe; locally in Ki. Roadside.
2. **Veronica didyma** Ten. (*V. agrestis* of authors, non Linn.; *V. polita* Fries) Field Speedwell 婆婆納 (P'o P'o Na; Maternal-grandmother's-gift) (G.M.1284; Hegi 6:53). Creeping annual; fls. pink, II–IV; capsules turgid. Eurasia; locally in Che., Hun., Ki., Ku. Roadsides. Fig. 334.
3. **Veronica persica** Poir. (*V. tournefortii* Gmel.) Byzantine Speedwell (G.M.1284). Creeping herb; fls. blue, III–VIII; capsules flattened. Eurasia; locally in Ki., Ku. Roadsides.
4. **Veronica undulata** Wall. (*V. anagallis* Linn.) Water Speedwell 水苦賈 (Shui K'u Mai; Water Lactuca) (B.M.1284; H.F.4:293). Ascending glabrous herb, to 1 m.; fls. blue, IV–VI; fr. VI–VIII. Western Himalayas, southern China; locally in Che., Hun., Hup., Ku. Wet places.
5. **Veronica galactites** Hance (*V. spuria* F. & H., non Linn.) 狼尾拉花 (Lang Wei La Hua; Curved Wolf-tail Flower) (ASNP V.5:232). Erect pubescent herb, to 0.7 m.; fls. blue, VII–IX. China; locally in An., Ki., Ku. Grassland.

2. **Centranthera** R. Br. 胡麻草屬 (Hu Ma Ts'ao Shu; Herbaceous sesame Genus)

Erect scabrid herbs with oblong to linear *entire* (ours) or toothed *opposite lvs.* (or the upper alternate) and alternate spicate bracteate 2-bracteolate fls.; *calyx spathe like*, split on one side; corolla tube inflated above; stamens 4, didynamous; *anthers spurred*; filaments hairy: capsule ovoid. 5 species, from eastern Asia to Malaya and Australia; 3 in China. (Greek meaning "*spur*", and "*flower*"; referring to the spurred anthers.)

1. **Centranthera cochinchinensis** (Lour.) Merr. (*C. brunoniana* Wall. ex Benth.; *C. hispida* R.Br.) (Mak.F.137; F.H.E.2:202). Slender herb, to 1 m.; fls. yellow, VIII–IX. Eastern Asia; locally in An., Hup., Ki., Ku. Grassland.

3. **Monochasma** Maxim. ex Franch. & Savat. 鹿耳草屬 (Lu Êrh Ts'ao Shu)

Weak perennial herbs with numerous lfy. brs.; lvs. often gray-or white-tomentose: *calyx 5-cleft or -parted, the lobes enlarging in fr. to about 1 cm. in length, with a tube about equal to the lobes*; corolla tubular, irregular; stamens included, didynamous: ovary incompletely 2-loculed, becoming a capsule with numerous seeds, dehiscent by a single cleft. 3 species in Japan and China; 2 in China. (Latin: *mono*, one, and *chasma*, opening; referring to the one-cleft capsule.)

Key to the Species

Lvs. tomentose beneath: corolla 2–3 x the calyx ..... 1. *M. savatieri*
Lvs. not tomentose: corolla shorter than the calyx ..... 2. *M. sheareri*

1. **Monochasma savatieri** Franch. ex Maxim. 鹿耳草 (Lu Êrh Ts'ao; Deer-ear Plant) (St.P.M.VII:29(3):58). Perennial herb, to 3 dm.; fls. pink, V–VII. Southeastern China; locally in Che., Ki., Ku. Grassland.

2. **Monochasma sheareri** (S. Moore) Maxim. (*Bungea sheareri* S. Moore) 栀子草 (Chih Tzŭ Ts'ao; Herbaceous Gardenia) (J.B.1875:229). Perennial herb, to 3 dm.; fls. pink, V. China; locally in Hup., Ki., Ku. Grassland.

4. **Lindernia** All. 母草属 (Mu Ts'ao Shu; Female-plant Genus)

Herbs with at least the lower lvs. opposite, and infl. on 1-fld. pedicels; *fls. small, 5-merous*; *calyx not enlarged in fr.*; corolla 2-lipped; stamens 4: capsule ovoid, barely exceeding the calyx. About 70 species, in tropical and subtropical regions, especially in the eastern hemisphere; 18 or more in China. (Named for Franz Balthasar von Lindern, 1682–1755, a botanist of Alsace.)

Key to the Species

a. Capsule globose to ellipsoid-ovoid, about equalling the calyx or shorter.
  Lvs. entire, semi-palmately veined ..... 1. *L. pyxidaria*
  Lvs. toothed, pinnately veined ..... 2. *L. crustacea*
aa. Capsule narrowly cylindric, longer than the calyx.
  Perfect stamens 4 ..... 3. *L. angustifolia*
  Perfect stamens 2, with 2 staminodes..... 4. *L. anagallis*

1. **Lindernia pyxidaria** All. (*Vandellia erecta* Benth.) 陌上菜 (Mo Shang Ts'ai; Field-margin Vegetable) (Mak.F.146;H.F.4:281). Herb, to 1 dm.; fls. purple, VII–VIII; calyx deeply cleft. Eurasia; locally in Che., Hun., Ki., Ku. Wet places.
2. **Lindernia crustacea** (L.) F. Muell. (*Vandellia crustacea* (L.) Benth.) 公草母草 (Kung Ts'ao Mu Ts'ao) (Be.F.251). Decumbent herb, to 1 dm.; fls. bluish or purplish, VI–IX; calyx not cleft below middle. Asia; locally in An., Che., Hup., Ki., Ku. Lawns and roadsides. Fig. 335.
3. **Lindernia angustifolia** (Benth.) Wettst. (Mak.F.147). Ascending herb, to 3 dm.; fls. purplish, V–IX. India, Malaysia to Japan; locally in An., Che., Hup., Ki. Moist places.
4. **Lindernia anagallis** (Burm.f.) Pennell (*Ruellia anagallis* Burm.f.) (AA.J.24:252). Herb. Common weed. Indo-Malaya; locally in Che., Hun., Ki.

5. **Antirrhinum** Linn. Snapdragon 金魚草属 (Chin Yü Ts'ao Shu)

Perennial *herbs* with opposite entire lvs. (or the upper alternate) and *large fls.* in terminal racemes or solitary; *corolla saccate at the base*, not spurred; upper lip erect and 2-lobed; the lower 3-lobed and spreading; throat almost closed by a palate: *capsule opening by pores* below the summit. 40 species, in the northern hemisphere, particularly North America; one or more cultivated in China. (Greek: *anti*, like; and *rhis, rhinos*, nose; referring to the shape of the flower.)

1. **Antirrhinum majus** Linn. Large Snapdragon 金魚草 (Chin Yü Ts'ao; Gold-fish Plant) (B.M.895). Perennial herb, to 1 m.; fls. red, purple, white, V–IX. Introduced from Mediterranean region; locally in An., Che., Ku. Planted, ornamental. Fig., 336.

6. **Scrophularia** Linn. Figwort 玄参属 (Hsüan Shên Shu)

Tall herbs with *square stems, serrate lvs.* and many *small fls.* in a slender terminal panicle; stamens declined; anther cells transverse and joined together: capsule septicidal;

seeds rugose. 150 species, in north temperate regions; 35 in China. (Named because it was reputed to be a remedy for scrophula.)

Key to the Species

Infl. spicate; fls. densely arranged, nearly sessile ..... 1. *S. buergeriana*
Infl. paniculate; fls. laxly arranged, with long slender pedicels ..... 2. *S. ningpoensis*

1. **Scrophularia buergeriana** Miq. (*S. oldhami* Oliv.) 玄参 (Hsüan Shên; Black Ginseng) (Mak.F.151;F.H.E.2:179). Erect perennial, to 1 3 m·; fls. VII–VIII; square stems. Japan, China; locally in Ku. Grassland.
2. **Scrophularia ningpoensis** Hemsley (F.H.E.2:178). Perennial herb, to 1 m.; fls. in panicles, purplish brown, VII–VIII. Southeastern China; locally in An., Che., Ki. Roadsides and hillsides.

7. **Mazus** Lour. Monkey Flower 通泉草属 (T'ung Chüan Ts'ao Shu)

Low herbs with incised often rosulate lvs. and blue or white *fls. in terminal one-sided racemes*; *corolla with two prominent ridges in the throat*; style 2-lobed; capsule loculicidal; seeds very small. 20 or more species, in Asia, Malaya and Australia; mostly in China. (Greek: *mazo*, teat, referring to the ridges of the corolla.)

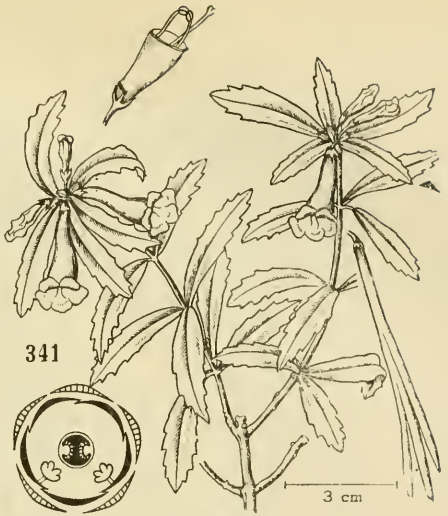
Key to the Species

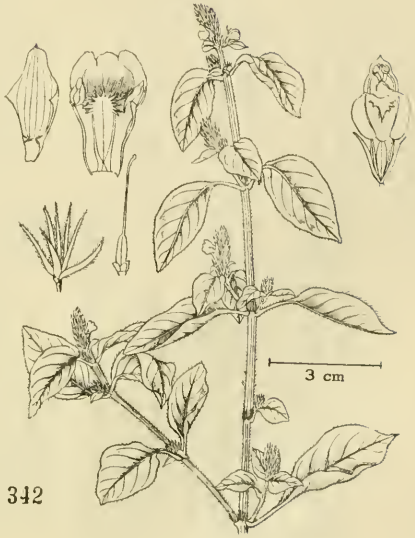
a. Plants not stoloniferous, the stem erect or flexuose.
  b. Lvs. mostly opposite.
    Stems decumbent or flexuose ..... 1. *M. japonicus*
    Stems erect, rigid.
      Lvs. sessile or nearly so ..... 2. *M. stachydifolius*
      Lvs. shortly petiolate, long-attenuate at base..... 3. *M. macranthus*
  bb. Lvs. all alternate..... 4. *M. caducifer*
aa. Plants stoloniferous, the stolons elongated, creeping and rooting 5. *M. miquelii*

1. **Mazus japonicus** (Thunb.) O. Ktze. (*M. rugosus* Lour.) 通泉草 (T'ung Ch'üan Ts'ao; Divided-by-the-brook Herb) (B.M. 898). Trailing perennial herb; fls. blue, brown-spotted, III–VI. Eastern Asia; locally in An., Che., Ki., Ku. Lawns and roadsides. Fig. 337.
2. **Mazus stachydifolius** (Turcz.) Maxim. 弹刀子菜 (Tan Tao Tzŭ Ts'ai; Elastic-knife Vegetable) (St.P.B.20:438). Erect herb, to 3 dm.; fls. purple, IV–VI. Eastern Asia; locally in An., Hup., Ki., Ku. Roadsides, grassland.
3. **Mazus macranthus** Diels (Di.F.566). Herb, 2 dm. high; fls. white, purple, IV. Eastern and central China; locally in An. Grassland.
4. **Mazus caducifer** Hance (J.B.1882:292). Herb, 15 cm. high; fls. purple, VI. Eastern China; locally in An. Grassland.
5. **Mazus miquelii** Mak. (*M. stolonifer* Mak.) (Mak.F.146;H.-M.7:835). Stoloniferous herb; fls. in dense spikes, purple, IV–VIII. China, Japan; locally in Hun., Ki. Moist ground.

8. **Phtheirospermum** Bunge 松蒿属 (Sung Hao Shu)

Viscid-pubescent brg. *herbs with opposite pinnatifid lvs.* and short-pedicelled axillary solitary ebracteolate fls.; calyx campanulate, 5-lobed; corolla 2-lipped, with 2-gibbous palate: capsule compressed, beaked, loculicidal; seeds numerous, reticulate. 4 species,





337. Mazus japonicus
338. Paulownia tomentosa

339. Sesamum indicum
340. Catalpa ovata

341. Lysionotis pauciflorus
342. Justicia procumbens

in eastern Asia; 2 in China. (Greek: *phtheiro*, to destroy, and *spermum*, seed.)

1. **Phtheirospermum chinese** Bunge 松蒿 (Sung Hao; Jungle Pine) (DC.P.10:539). Viscid-pubescent annual or biennial, to 0.8 m.; fls. rose-pink, VIII–X. China, Korea, Japan; locally in Che., Hup., Ki., Ku. Moist meadows.

9. **Torenia** Linn. 瓜草属 (Kua Ts'ao Shu; Mellon Herb Genus)

Annual or biennial *herbs* with fls. on ebracteolate pedicels; *calyx* tubular, *plicate*, 3–5-*winged*; corolla tube dilated above, the upper lip concave; the two upper stamens included, the lower appendaged at the base and joined under the upper lip; *anthers touching or joined in prs.*: valves of the capsule separating from the axis. 30 species, tropical Asia and Africa; 14 in China. (After Olaf Toren, a Swedish clergyman, who discovered *T. asiatica* while travelling in China, 1750–1752.)

Key to the Species

a. Limb of the corolla distinctly 2-lipped; lower lip of three smaller rounded lobes, dark purple, the central lobe with a yellow spot at the base; upper lip larger, slightly 2-lobed, pale blue ..... 1. *T. fournieri*

aa. Limb of the corolla of five nearly equal lobes, pale purple; lateral lobes each with a deep purple spot; lower lobe with a yellow spot.

Calyx with decurrent base.

Upper corolla-lip entire ..... 2. *T. violacea*

Upper corolla-lip bilobed ..... 3. *T. asiatica*

Calyx with rounded base ..... 4. *T. cordifolia*

1. **Torenia fournieri** Lindl. (B.M.897). Annual, 3–4 dm. high; fls. purple, IX; fr. X. Introduced from Cochinchina; locally in Ku. Planted, ornamental.
2. **Torenia violacea** Pennell (*T. peduncularis* Benth.; *T. edentula* Benth.) (H.F.4:276; AA.J.24:254). Annual, to 2 dm.; fls. purple, VIII–IX. Eastern Asia; locally in Che., Hup., Ki. Woodland.
3. **Torenia asiatica** Linn. (B.M.897). Diffuse herb, 1.5–2.5 dm. high; fls. purple, VII–VIII; frtg. calyx 2.5 cm. long. India, Malaysia, China; locally in An., Che., Ki. Moist places.
4. **Torenia cordifolia** Roxb. (H.F.4:276). Annual, 1–2 dm. high; fls. purple, VII–IX; pedicels longer than the lvs. Northern India, Java, southern China; locally in Che., Ki. Mountain slopes.

10. **Siphonostegia** Benth. 阴行草属 (Yin Hsing Ts'ao Shu)

Pubescent or glandular *herbs many of which darken in drying*: the lower lvs. opposite and the upper alternate: fls. yellow or purple, 2-bracteolate, in axillary racemes; *calyx tubular*, 10-*nerved*; corolla tube cylindric; the limb 2-lipped; style filiform: seeds hyaline, reticulate. 4 species, in tropical and subtropical Asia; 2 in China. (Greek: *siphon*, a tube, and *stegos*, a covering.)

Key to the Species

Floral lvs. shorter than the calyx: calyx limb not foliaceous, up to 5 mm. long: plant conspicuously darkened in drying..... 1. *S. chinensis*

Floral lvs., or some of them, longer than the calyx: calyx limb foliaceous, up to one cm. long: plant not darkened conspicuously in drying .... 2. *S. laeta*

1. **Siphonostegia chinensis** Benth. 陰行草 (Yin Hsing Ts'ao; Shade-loving Plant) (Mak.F.134). Erect herb, to 1 m.; fls. yellow, VIII. China, Japan, Korea; locally in An., Che., Ki., Ku. Grassland.
2. **Siphonostegia laeta** S. Moore (J.B.1880:5). Herb, to 0.8 m.; fls. yellow, tinged pink, VIII–IX. China; locally in An., Che., Hun., Ki., Ku. Woodland.

11. **Melampyrum** Linn. Cow Wheat 山羅花属 (Shan Lo Hua Shu)

Slender-stemmed erect *annuals* with *entire lvs.* or the upper lvs. mostly toothed at the base, the *foliage darkening in drying*: *fls. solitary in the upper axils*; tube of the corolla enlarging above; the upper lip straight in front; the lower biconvex; anthers approximate, nearly vertical, hairy: seeds 4 or fewer in each capsule. 15–30 species, in north temperate regions; 4 in China. (Greek: *melas*, black; and *pyros*, wheat; referring to the black seeds of some species.)

Key to the Species

Bract-awn longer than the width of the bract; calyx-teeth lanceolate.... 1. *M. roseum*
Bract-awn shorter than the width of the bract; calyx-teeth broad, triangular to sublanceolate..... 2. *M. esquirolii*

1. **Melampyrum roseum** Maxim. 山羅花 (Shan Lo Hua; Mountain-vine Flower) (Mak.F.134). Herb, to 0.8 m.; fls. pink, red, purple, VI–IX; calyx teeth narrow, long-awned. China, Korea, Japan; locally in An., Che., Ki., Ku. Brushland.
2. **Melampyrum esquirolii** (Lévl. & Vant.) Hand.-Mazz. (*Scutellaria esquirolii* Lévl. & Vant.) (Fe.R.8:402). Herb; fls. purple to red, IV–IX; calyx teeth broad, short-awned. China; locally in An., Che., Hun., Hup., Ki. Mountain slopes.

12. **Pedicularis** Linn. Lousewort 馬先蒿属 (Ma Hsien Hao Shu; Horse-in-front-of-the-jungle Genus)

Stout-stemmed perennial herbs, darkening in drying, with *mostly pinnatifid lvs.* and rather large fls. in spikes: corolla with the upper lip flattened, the lower 2-crested above; anthers transverse: *capsule* mostly oblique, *many-seeded*. 600 species, in northern and mountain regions; 280 in China. (Latin: *pediculus*, a louse, also diminutive of foot.)

1. **Pedicularis henryi** Maxim. (St.P.B.32:560). Erect herb, to 4 dm.; fls. pink, VII. China; locally in Hup., Ki. Brushland.

13. **Botryopleuron** Hemsl. 穗脈属 (Sui Mê Shu)

Prostrate or wandering perennial herbs or sub-shrubs with alternate lvs. and small *fls. in* axillary *aments*: *calyx and corolla* about *equally* 4-cleft; stamens 2, exserted: fr. a capsule dehiscing by 4 valves, with numerous small seeds. About 12 species, in China and Japan; 10 in China. (Greek: *botryo*, a cluster of grapes, and *pleuron*, a rib, perhaps referring to the clusters of small flowers at the base of the prominently-nerved nearly sessile leaf blades.)

1. **Botryopleuron axillare** (S. & Z.) Hemsl. (*Calorhabdos axillaris* Benth. & Hook.f.) 釣魚竿 (Tiao Yü Kan; Fishing-pole) (Mak.F.139; H.I.27t.2670). Herb, twining or prostrate; fls. reddish purple, VII–IX. Eastern China, Japan; locally in Che., Ki. Shaded ravines.

14. **Digitalis** Linn. Foxglove 毛地黃属 (Mao Ti Huang Shu)

Tall *herbs* with *alternate lvs.* and *showy fls. in terminal* often 1-sided *racemes*; corolla declined, often constricted above the ovary; stamens included: seeds numerous. 25 species, in western and central Eurasia; one cultivated in China. (Latin: *digitalis*, of or belonging to the finger; the flowers were thought to resemble the fingers of a glove.)

1. **Digitalis purpurea** Linn. 毛地黃 (Mao Ti Huang; Hairy Rehmannia) (B.M.894). Erect biennial or perennial, to 1.5 m.; fls. purple, yellow, white, V–VI; lvs. downy-pubescent. Introduced from western Europe; locally in An., Che., Ku. Cultivated, ornamental, grown as a drug plant in western countries.

15. **Rehmannia** Libosch. ex Fisch. & Mey. 地黃属 (Ti Huang Shu)

Viscous-villous perennial herbs, *brg. from the base*: fls. large, borne in terminal leafy racemes; calyx and corolla 5-lobed or -cleft; posterior segment of calyx elongated; corolla somewhat 2-lipped; stamens 4, included: fr. a dehiscent capsule with many small seeds. 5 or more species, in China and Japan, all or most of them in China. (Named for J. X. Rehmann, 1753–1831, a German physician and writer of pharamaceutical publications.)

1. **Rehmannia glutinosa** Libosch. (*R. chinensis* Fisch. & Mey.) 地黃 (Ti Huang) (Mak.F.138;F.H.E.2:193). Brg. glutinous herb, 3–6 dm. high; fls. purple, VI–VIII. North and northeastern China; locally in An., Ku. Mountain slopes.

16. **Paulownia** Sieb. & Zucc. 泡桐属 (P'ao T'ung Shu)

Deciduous trees with chambered pith and *showy fragrant fls.* in terminal panicles which *appear before the lvs.*; corolla tube enlarged above, with an oblique limb: capsule 2-valved, with numerous small winged seeds. 10 species, in eastern Asia, most of them in China. (After Anna Paulowna, Princess of the Netherlands.)

Key to the Species

Lvs. and corolla pubescent or tomentose.
  Lvs. glabrous above, tomentose beneath: corolla white, spotted purple within, silky pubescent ..... 1. *P. fortunei*
  Lvs. pubescent above, pubescent or tomentose beneath: corolla violet, with darker spots and yellow stripes inside, glandular-pubescent outside ..... 2. *P. tomentosa*
Lvs. and corolla glabrous; corolla whitish or pale violet..... 3. *P. rehderiana*

1. **Paulownia fortunei** (Seem.) Hemsl. 泡桐 (P'ao T'ung; Bubble T'ung) (Lee 937). Tree, to 25 m.; fls. white, spotted purple, IV–V; fr. IX–X. China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland.
2. **Paulownia tomentosa** (Thunb.) Steud. 日本泡桐 (Jih Pên P'ao T'ung; Japanese Paulownia) (R.M.786). Tree, to 15 m.; fls. pale violet, with spots and yellow stripes within, IV–V; fr. IX–X. Introduced from Japan, Korea; locally in An., Hup., Ku. Planted, ornamental. Fig. 338.
3. **Paulownia rehderiana** Hand.-Mazz. 贛桐 (Kan T'ung; Kiangsi Paulownia) (Lee 940). Tree; fls. whitish or pale violet. Central China; locally in Ki. Woodland.

"Yamazaki describes a new species: *Petitmengina matsumurae* in J.J.B. 25:214. 1950, from Nanking, Kiangsu. The genus is otherwise considered monotypic and of Indo-China. I cannot make out the identity of this species. Perhaps it is *Melasma arvense* but the latter species has not been recorded in our area."—Hui-lin Li.

154. **PEDALIACEAE** Sesame Family 胡麻科 (Hu Ma K'o)

Herbs, or rarely shrubs, with *opposite lvs.*; or the upper alternate; the foliage covered with slime-secreting glands: fls. 5-merous, perfect, irregular, axillary and in terminal racemes or solitary; corolla somewhat inflated at the base, 2-lipped; stamens 4, in 2 prs., included: *fr. a* 2-4-*celled capsule or nut.* 16 genera with 50 species, in tropical and subtropical Africa, Asia, Australia and the East Indies; 2 genera and 2 species in China.

Key to the Genera

Stout erect terrestrial herbs: fr. a dehiscent capsule ..... 1. *Sesamum*
Weak-stemmed aquatic herbs: fr. indehiscent, winged, bearing 3 curved hooks at the top ..... 2. *Trapella*

1. **Sesamum** Linn. 胡麻属 (Hu Ma Shu)

Erect (ours) or prostrate *terrestrial* herbs with large irregular white or pink axillary fls.; ovary superior: *fr.* an abundance of 2-celled *dehiscent capsules* packed with many flat seeds. 20 species, in the eastern tropics; one cultivated in China. (The Greek form of an Arabic name.)

1. **Sesamum indicum** Linn. (*S. orientale* Linn.) Sesame 芝蔴 (Chih Ma; Prickly Hemp) (B.M.908). Erect herbs, to 1 m.; fls. rose, white, VII-VIII; fr. IX-X. Tropical countries; locally in An., Hun., Hup., Ki., Ku. Cultivated, seed, occasionally escaped or naturalized. Fig. 339.

Linnaeus described *Sesamum indicum* and *S. orientale* on p. 634 of Species Plantarum (1753), *S. orientale* appearing first. *S. orientale* Linn. is given by De Candolle as a synonym for his var. *subindivisum* under *S. indicum* Linn. (DC.P. 9:250.1845).

2. **Trapella** Oliv. 茶菱属 (Ch'a Ling Shu)

Weak-stemmed aquatic herb with solitary axillary fls.; ovary inferior: *fr. indehiscent*, winged, *one-seeded, bearing* 3 *recurved hooks at the top.* One species, in China. (The fruit resembles that of Trapa.)

1. **Trapella sinensis** Oliv. 茶菱 (Ch'a Ling; Tea Water-caltrop) (Hu P. 59). Aquatic herbaceous vine; fls. VII; fr. IX. China, Japan; locally in Hup., Ku. Ponds, lakes.

155. **LENTIBULARIACEAE** Bladderwort Family 狸藻科 (Li Tsao K'o

Small *annuals growing in water or wet places*, with whorled persistent pinnate *lvs. divided into filiform segments* which bear *small bladders at their bases*, and regarded as carnivorous by means of the bladders: or in terrestrial forms alternate and disappearing before flg.: fls. perfect, irregular, few and scapose, yellow, purplish or nearly white; calyx and corolla 2-lipped; stamens 2, inserted on the corolla; ovary superior: *fr. a* small 2-4-*valved capsule.* 5 genera with 250 species, in all parts of the world; one genus and 10 species in China.

1. **Utricularia** Linn. Bladderwort 狸藻属 (Li Tsao Shu)

Aquatic or immersed herbs with *capillary dissected lvs. bearing small bladders* which float the plant at the time of flg.; or rooting in the mud and then with few or no lvs. or bladders: bladders with a valvular lid and with bristles at the mouth: scapes one-several-fld.; *calyx lobes entire*; corolla with a palate which nearly closes the throat. Over 200 species, widely distributed; 10 in China. (Latin: *utriculus*, a little bladder.)

Key to the Species

a. Floating or submersed plants: lvs. divided into capillary segments and generally interspersed with utricles (small bladders): fls. yellow.
  Flg. peduncles slender, 8–10 cm. long, with bracts 1–2 mm. long; fls. 5–10 mm. across: lfy. stems relatively slender: plant delicate.. 1. *U. aurea*
  Flg. peduncles stout, 12–15 cm. long, with bracts 5–6 mm. long; fls. 15 mm. across: lfy. stems relatively stout: plant robust ..... 2. *U. vulgaris*
aa. Marsh plants: lvs. basal and entire or none.
  Fls. yellow; scales of the flg. peduncle attached at the base ..... 3. *U. bifida*
  Fls. blue or bluish purple; scales of flg. peduncle attached at the middle, pointed above and below..... 4. *U. racemosa*

1. **Utricularia aurea** Lour. (*U. flexuosa* Vahl) 細葉狸藻 (Hsi Yeh Li Tsao) (M.F.432; M.L.356). Delicate submersed aquatic; fls. yellow, VII–X. Eastern Asia, Malaya, Australia; locally in An., Ku. Ponds, lakes.
2. **Utricularia vulgaris** Linn. Greater Bladderwort 狸藻 (Li Tsao; Wild-cat Waterweed) (G.M.1306). Robust submersed aquatic; fls. yellow, VI–VIII. Eurasia, North America; locally in An., Ku. Ponds, lakes.
3. **Utricularia bifida** Linn. (M.F.433). Terrestrial; fls. yellow, VII–IX; lvs. linear-spatulate. India, South China, Malaya; locally in Hu., Ki. Swampy ground.
4. **Utricularia racemosa** Wall. ex A.DC. 紫耳挖草 (Tzŭ Êrh Wa Tsao; Purple Ear-digger Grass, comparing the slender erect peduncle with flower bud to the small spoon-like instrument with which a Chinese barber removes wax from his patron's ears) (Be.F.256). Terrestrial; fls. bluish purple, VII–VIII; lvs. none at time of flg. India, South China, Malaya; locally in Ki. Wet ground.

156. **BIGNONIACEAE** Bignonia Family 紫葳科 (Tzŭ Wei K'o; Luxuriant-purple Family)

Trees, *shrubs* or herbs, *often climbing*, with opposite (rarely alternate) estipulate lvs. and perfect irregular usually large and showy 5-merous fls. in terminal or axillary racemes or panicles; corolla oblique, rarely 2-lipped; stamens 4, didynamous, with one (rarely 2, 3 or 5) sterile stamen; ovary superior with a disk at the base: fr. an elongated dehiscent capsule bearing numerous *winged seeds*. 110 genera with 750 species, tropical and subtropical; 7 genera and 14 species in China.

Key to the Genera

Woody climbing vines with pinnately compound lvs..... 1. *Campsis*
Deciduous trees with simple lvs..... 2. *Catalpa*

1. **Campsis** Lour. Trumpet Creeper 凌霄花属 (Ling Hsiao Hua Shu)

Deciduous *woody vines*, usually *climbing* by aerial rootlets, with *odd-pinnate lvs.* and *large orange or scarlet fls.* in terminal clusters; corolla funnel-form; *stamens* 4,

included: capsule stipitate, the valves separating from the septum. 2 species, one in North America and one in eastern Asia. (Greek: *kampsis*, curvature, referring to the curved stamens.)

Key to the Species

Lfts. glabrous beneath: calyx teeth triangular: capsule obtuse at the apex 1. *C. grandiflora*
Lfts. pubescent beneath, at least along the midrib: calyx teeth slender and acuminate: capsule beaked, keeled along the sutures ..... 2. *C. radicans*

1. **Campsis grandiflora** (Thunb.) K. Schum. (*C. chinensis* (Lam.) Voss; *Tecoma grandiflora* (Thunb.) Loisel.) Chinese Trumpet Creeper 凌霄花 (Ling Hsiao Hua; Rising-cloud Flower) (R.M.821). Climbing shrub; fls. reddish orange, VII–IX. China; locally in Ki., Ku. Brushy cliffs.
2. **Campsis radicans** (L.) Seem. American Trumpet Creeper (R.M.820). Climbing shrub; fls. orange red, VII–IX. Introduced from southeastern United States; locally in Ku. Planted, ornamental.

2. **Catalpa** Scop. 梓樹屬 (Tzŭ Shu Shu)

Trees, usually *deciduous*, with *simple lvs.* and white, pink or yellow fls. in showy terminal panicles: corolla campanulate: *stamens* 2, with divergent anthers: capsule long-cylindric, separating into 2 valves. 10 species, in North America, West Indies and Eastern Asia; 5 in China. (The Indian name of the tree.)

Key to the Species

a. Fls. yellowish, small, 1.5–2 cm. long: lvs. often shallowly 3–5-lobed, glandular near base of blade: fr. slender, about 8 mm. in diam... 1. *C. ovata*
aa. Fls. white or pinkish, large, 3–5 cm. long: lvs. entire, not glandular.
Lvs. pubescent beneath, 15–30 cm. long: fls. in a large panicle, with 2 yellow stripes inside: fr. about 15 mm. in diam.
Fls. conspicuously spotted; the lobes crimped ..... 2. *C. bignonioides*
Fls. inconspicuously spotted; the lobes nearly flat..... 3. *C. speciosa*
Lvs. glabrous beneath, smaller: fls. in 3–12-fld. racemes: fr. slender.. 4. *C. bungei*

1. **Catalpa ovata** G. Don (*C. kaempferi* Sieb. & Zucc.) 梓樹 (Tzŭ Shu; Native Tree) (R. M. 821). Tree, to 10 m.; fls. yellowish, 1.5–2 cm. long, striped and spotted, V–VI; fr. IX–X; plant usually darkens in drying. China; locally in An., Che., Hun., Hup., Ku. Planted, ornamental. Fig. 340.
2. **Catalpa bignonioides** Walt. Common Catalpa (R.M.822). Tree, to 15 m.; fls. white, 3–5 cm. long, striped and conspicuously spotted, V–VII. Introduced from eastern North America; locally in Ku. Planted, ornamental.
3. **Catalpa speciosa** Warder Western Catalpa 黃金樹 (Huang Chin Shu; Yellow-gold Tree) (R.M.822). Tree, to 30 m.; fls. white, striped and inconspicuously spotted, VI. Introduced from eastern North America; locally in Ku. Planted, ornamental.
4. **Catalpa bungei** C. A. Mey. 楸樹 (Ch'iu Shu) (R.M.822). Tree, to 10 m.; fls. white, purple spotted, V. Northern China; locally in Che., Ku. Planted, ornamental.

157. **OROBANCHACEAE** Broom Rape Family 列当科 (Lieh Tang K'o)

Fleshy *herbaceous root parasites without green color or normal lvs.*: fls. solitary

or in terminal spikes; calyx persistent; corolla tubular, more or less 2-lipped; *stamens* 4, didynamous, *inserted on the corolla tube*; anthers 2-celled; *ovary superior*; stigma large: fr. a one-celled 2-valved capsule with numerous minute seeds. 13 genera with 140 species, in temperate and tropical regions; 6 genera and over 10 species in China.

KEY TO THE GENERA

Fls. solitary on naked scapes, 5-40 cm. high ..... 1. *Aeginetia*
Fls. clustered at the top of a scale-leafy stem, to 6 cm. high ..... 2. *Tienmuia*

1. **Aeginetia** Linn. 野菰属 (Yeh Ku Shu)

Stems naked or scaly, leafless: *fls.* few, large, *solitary, on naked scapes*, ebracteolate; *calyx spatheaceous*; *corolla obscurely 2-lipped*; stamens included; *anther cells unequal*; placentae large, 2-lobed, filling the cavity of the ovary: seeds pitted. 5 species, in tropical Asia; 2 in China. (In memory of Paul Aeginette, a physician who flourished in the 7th century.)

KEY TO THE SPECIES

Fl. buds acuminate; fls. 2-4.5 cm. long; calyx acuminate ..... 1. *A. indica*
Fl. buds rotund, obtuse; fls. to 6 cm. long; calyx obtuse ..... 2. *A. sinensis*

1. **Aeginetia indica** Linn. 野菰 (Yeh Ku; Wild Mushroom) (Mak.F.130). Root parasite, to 4 dm.; fls. reddish purple, VII-VIII; fr. IX-X. Eastern Asia; locally in An., Hun., Ki., Ku. Parasitic on roots of woody plants.
2. **Aeginetia sinensis** G. Beck (E.P.96(IV.261):19). Root parasite, to 6 cm.; fls. rose-colored, VI-VII. China, Japan; locally in Ki. Parasitic on shrub roots.

No authentic specimens of *A. sinensis* have been available for study. Certain specimens at the Gray Herbarium, re-labelled *A. sinensis*, e. g. Steward 2605 from Kiangsi, have scapes up to 4 × the 6 cm. allowed in the original description of the species. Furthermore, the flower buds are not clearly obtuse. Perhaps this will be found to be at most a variety of the wide-ranging *A. indica*.

2. **Tienmuia** Hu 天目草属 (T'ien Mu Ts'ao Shu)

A fleshy parasitic herb, growing on the roots of woody plants: lvs. scale-like, alternate, imbricate: *fls.* hermaphrodite, *in crowded terminal clusters*, without bracts; calyx spathe-like, cleft to the base in front; corolla cylindric-tubular below, 5-lobed and 2-lipped above; stamens 3, included; ovary 1-celled, with 4 parietal placentae. One species, in east-central China. (Named for the type locality, Tien Mu Shan, northwestern Chekiang, China.)

1. **Tienmuia triandra** Hu (Fa.B.9:6). Fleshy parasitic herb, to 6 cm.; fls. in terminal clusters, ivory-white, V. East-central China; locally in Che. Parasitic on tree roots.

158. **GESNERIACEAE** GESNERIA FAMILY 苦苣苔科 (K'u Chü T'ai K'o; Bitter Lettuce-sprout Family)

Herbs, shrubs, or rarely small trees, with simple *lvs.* (ours *whorled or basal*) and infl. various: fls. perfect, usually irregular, 5-merous; stamens 4, didynamous, inserted on the corolla tube, often only 2 fertile; *ovary 1-celled*, or falsely 2-4-celled: fr. fleshy or capsular, with *numerous seeds*. 85 genera with 1,200 species, mostly tropical; 15

genera and 70 species in China.

Key to the Genera

Perfect stamens 2: stems evident and brg. ..... 1. *Lysionotis*
Perfect stamens 4: stems very short or none ..... 2. *Oreocharis*

1. **Lysionotis** D. Don 紫背金盤属 (Tzŭ Pei Chin P'an Shu)

Glabrous epiphytic *shrubs with evident stems, opposite or ternate lvs.* and infl. in lax many-fld. peduncled cymes; sepals narrowly lanceolate; corolla tubular, inflated at the middle, 2-lipped; *perfect stamens* 2: anthers connivent; connective with an oblong process; ovary superior, stipitate: capsule linear: seeds hairy-tufted. 5 species, in eastern Asia; all in China. (Greek: *luo*, to release, and *noto*, the back; in reference to the capsule which opens elastically along the dorsal suture.)

1. **Lysionotis pauciflorus** Maxim. 紫背金盤 (Tzŭ Pei Chin P'an; Purple-backed-golden-dish) (DC.M.5(1):59). Prostrate shrub or bush, to 1 m.; fls. pink-purple, VIII. Japan, southern China; locally in An., Che., Hun., Hup., Ki. Shaded ravines. Fig. 341.

2. **Oreocharis** Benth. 岩桐草属 (Yen T'ung Ts'ao Shu; Cliff-Aleurites-herb Genus)

Almost *stemless* reddish wooly herbs with *basal* petiolate *lvs.* and blue scapose fls. in umbels or cymes; corolla campanulate; *perfect stamens* 4; anthers free; ovary superior; capsule linear. 15 species, in eastern Asia; 10 in China.

1. **Oreocharis auricula** (Moore) C. B. Clarke (DC.M.5(1):64). Perennial acaulescent herb; fls. pink-purple, VII–IX. Central China; locally in Ki. Moist shade.

159. **ACANTHACEAE** Acanthus Family 爵牀科 (Chio Ch'uang K'o)

Herbs (ours) or shrubs with simple, usually *entire*, opposite estipulate *lvs.* and perfect gamopetalous 5-merous fls.: stems often 4-angled: corolla irregular, often 2-lipped; stamens 4 or 2; *ovary* superior, *not deeply lobed*; style one, slender, often long-exserted: *fr. a* 2-celled, 2–4-*seeded capsule*. 240 genera with 2,200 species, mostly tropical; 20 genera and 50 species in China.

Key to the Genera

Tube of the corolla long-exserted; fls. scattered, or in panicled or cymose clusters, not in heads or spikes; anther cells blunt or awnless ..... 1. *Dicliptera*
Tube of the corolla not long-exserted; fls. often in heads or spikes, sometimes in scattered clusters; anther cells with a white basal appendage.. 2. *Justicia*

1. **Dicliptera** Juss. 九頭獅子草属 (Chiu T'ou Shih Tzŭ Ts'ao Shu)

Erect or spreading brg. herbs with opposite nearly entire short-petiolate lvs.: *fls.* in pairs (one often smaller), subtended by unequal pairs of conspicuous bracts, *scattered or in panicled or cymose clusters*; calyx and corolla 5-merous; *tube of the corolla long-exserted*; limb deeply 2-lipped; stamens 2, exserted; anther cells blunt or awnless: ovary 2-celled, becoming 4-seeded; partition of the ovary not persistent; placenta rising elastically from base of the capsule. 50 species, in tropical regions; 2 or more in China. (Greek: *diclis*, double-folding, as of doors, and *pteron*, a wing, alluding to the involucel.

1. **Dicliptera japonica** (Thunb.) Mak. (*D. crinita* (Thunb.) Nees) 九頭獅子草 (Chiu T'ou Shih Tzŭ Ts'ao; Nine-headed-lion Herb) (Mak.F.124:F.H.E.2:248). Erect or spreading herb, to 5 dm.; fls. in unequal pairs, pink, VII. Japan, China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland shade.

There is considerable confusion as to the relationship of *Dicliptera japonica* (Thunb.) Mak. (*D. crinita* (Thunb.) Nees) and Chinese material identified in recent years as representing *Peristrophe bivalvis* (L.) Merr. (*P. tinctoria* Nees). It is suspected that eventually the material from both Japan and China may be found to belong in *Peristrophe*.

2. **Justicia** Linn. 爵牀屬 (Chio Ch'uang Shu)

Herbs or shrubs with entire lvs. and sessile fls. often in spikes or panicles, sometimes in scattered clusters; corolla 2-lipped, not long-exserted; stamens 2; *anther cells spurred at the base*; filaments hairy near the base; capsule 4-seeded; seeds tubercular, scaly or hairy. 250 species, tropical; 10 in China. (Named after James Justice, Scotch gardner, author of "British Gardner's Director", 1754.)

Key to the Species

Fls. in dense terminal or axillary spikes; bracts and calyx segments awl-shaped ..... 1. *J. procumbens*
Fls. in loose terminal or axillary fascicles; bracts ovate to orbicular .. 2. *J. championi*

1. **Justicia procumbens** Linn. 爵牀 (Chio Ch'uang; Wine-cup Saucer) (Mak.F.124), Decumbent annual; fls. bluish, purplish, VII-X. Eastern Asia; locally in An.. Che., Hun., Hup., Ki., Ku. Roadsides, waste places. Fig. 342.
2. **Justicia championi** T. Anders. ex Benth. (*Adhatoda chinensis* Benth.) (Be.F.264). Weak herb, to 1 m.; fls. white, VIII. Southeastern Asia; locally in Hun., Hup., Ki. Damp shade.

160. **PHRYMACEAE** Lopseed Family 蠅毒草科 (Ying Tu Ts'ao K'o)

A perennial herb with *opposite simple coarsely-toothed lvs.* and small purplish or rose-colored fls. in slender terminal spikes; calyx and corolla 2-lipped; stamens included; *fls. strongly reflexed in fr.*: *fr. dry, one-celled and one-seeded.* Only the following genus. (Derivation of the name unknown.)

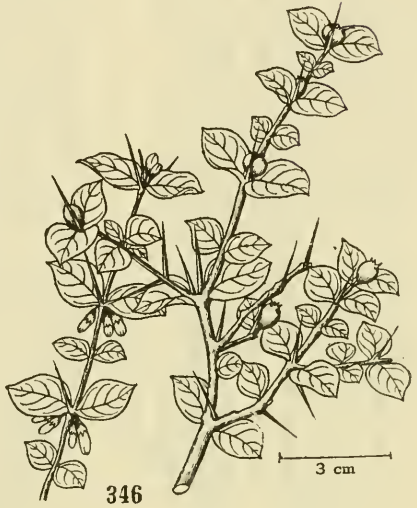
1. **Phryma** Linn. Lopseed 蠅毒草屬 (Ying Tu Ts'ao Shu)

Characters of the family. One species, in eastern Asia and eastern North America.

1. **Phryma leptostachya** Linn. 蠅毒草 (Ying Tu Ts'ao; Poisonous-fly-plant) (G.M.1313). Erect herb, to 1 m.; fls. purplish, VII-VIII. Eastern Asia, eastern North America; locally in An., Ku. Woodland. Fig. 343.

161. **PLANTAGINACEAE** Plantain Family 車前科 (Ch'ê Ch'ien K'o)

Mostly stemless herbs with basal lvs. and small greenish often dimorphous fls. in dense terminal scapose spikes; fls. 4-merous; *corolla membranous*, veinless, gamopetalous; stamens on the corolla tube; ovary superior, 2-4-celled: *fr. a circumscissile capsule* (ours) or indehiscent. 3 genera with 200 species, in all parts of the world; one genus and 4 species in China.



343. Phryma leptostachya
344. Plantago major

345. Uncaria rhynchophylla
346. Damnacanthus indicus

347. Gardenia jasminioides
348. Paederia scandens

1. **Plantago** Linn. Plantain 車前属 (Ch'ê Ch'ien Shu)

Terrestrial plants: *scape several*-many-*fld.*; fls. mostly bisexual; stamens exserted; *ovary 2-celled*; *fr. a 2-several-seeded capsule*, opening at the top. About 70 or more species, in tropical and subtropical parts of the world; 10 or more in China. (Latin; *planta*, footprint.)

1. **Plantago major** Linn. Common Plantain 車前 (Ch'ê Ch'ien; Roadside Weed) (G.M.1315). Stemless perennial; fls. whitish, V–VII. Cosmopolitan; locally in An., Ki., Ku. Roadsides, waste places. Fig. 344.

162. **RUBIACEAE** Madder Family 茜草科 (Ch'ien Ts'ao K'o)

Woody or herbaceous plants with *opposite or whorled* entire *stipulate lvs.* and mostly regular perfect 4–5-merous fls.; stamens inserted on the corolla tube or at its mouth; *ovary inferior*, usually 2-celled; fr. capsular, baccate or drupaceous. 400 genera with 5,000 species, widely distributed, mostly in tropics; 40 genera and 120 species in China.

Key to the Genera

A. Plants woody.
  B. Fls. in globular heads or head-like clusters.
    C. Fr. dry at maturity.
      Trees or shrubs, not vines.
        Calyx 5-lobed; ovaries distinct, becoming 2-celled many-seeded dehiscent capsules: seeds winged .. 1. *Adina*
        Calyx 4-lobed; ovaries confluent, the carpels separating at maturity into obpyramidal 1-seeded nutlets .. 2. *Cephalanthus*
      Vines, climbing by hooked peduncles: calyx 5-lobed: ovaries distinct, becoming 2-celled many-seeded capsules: seeds winged ..... 3. *Uncaria*
    CC. Fr. fleshy at maturity: calyx truncate or obscurely 4–7-lobed; ovary 2–4-celled, developing in fr. as many 1-seeded nutlets buried in the fleshy syncarp: ours a diffuse or climbing shrub ..... 4. *Morinda*
  BB. Fls. in cymes or panicles, or scattered, not in heads.
    D. Shrubs with slender spines at the nodes, 1 for each lf., often exceeding the lvs. ..... 5. *Damnacanthus*
    DD. Shrubs, vines, or trees without spines (sometimes with prickly stipules in *Serissa*).
      E. Infl. terminal bearing broad leaf-like white or yellow petiolate bracts or enlarged, persistent calyx lobes, not more than 1 on a particular fl. or fr.: trees 6. *Emmenopterys*
      EE. Infl. without conspicuous bracts.
        F. Fls. large, 3–5 cm. long: fr. topped with 5 slender calyx lobes..... 7. *Gardenia*
        FF. Fls. small, 1–2 cm. long.
          G. Stipular sheaths armed with 1–3 stiff bristles: bracts and calyx lobes sometimes bristle-tipped: bushy shrubs .... 8. *Serissa*
          GG. Stipules, bracts and calyx lobes unarmed.
            H. Shrubs or trees, not vines.
  I. Fls. in terminal many-fld. corymbs: fr. a 2–several-seeded berry 9. *Tarenna*

II. Fls. in axillary or leaf-opposed clusters, or solitary.
J. Anthers linear: fls. white, tubular-cylindric, at least in bud, about 10 mm. long; calyces and axes of the infl. glabrous.
Anthers exserted and reflexed, subsessile, nearly as long as corolla lobes: corolla tube very short: fr. black 10. *Randia*
Anthers included: corolla tube longer than the lobes: fr. red. 11. *Prismatomeris*
JJ. Anthers oblong, sessile or nearly so: calyces and axes of the infl. pubescent.
Fls. white, tubular or salver-form, 8–10 mm. long; lobes of corolla shorter than the tube: fr. blue ..... 12. *Lasianthus*
Fls. yellow, campanulate, about 5 mm. long, subtended by 1 or 2 whorls of calyx-like bracts outside the calyx: fr. red ..... 13. *Tricalysia*
HH. Woody vines.
Vine woody at base, herbaceous above, twining: fls. many, in axillary and terminal panicles; style 2-parted to near the base: fr. berry-like, dry at maturity..... 14. *Paederia*
Vine woody throughout, trailing: fls. few, axillary, scattered; style club-shaped, exserted: fr. a capsule ..... 15. *Thysanospermum*
AA. Plants herbaceous.
K. Lvs. opposite.
Coarse twining vines with large lvs., 5–15 cm. long 14. *Paederia*
Plants with small lvs., 1–3 cm. long.
Infl. a terminal cyme..... 16. *Ophiorrhiza*
Infl. axillary ..... 17. *Hedyotis*
KK. Lvs. verticillate.
Fls. 5-merous: fr. fleshy ..... 18. *Rubia*
Fls. 4-merous: fr. dry or nearly so..... 19. *Galium*

1. **Adina** Salisb. 水冬瓜属 (Shui Tung Kua Shu; Water-winter-squash Genus)

Trees or *shrubs*; lvs. long-petioled, with caducous stipules; *fls.* small, 5-*merous*, *in globular heads*; style filiform, longer than the stamens; *fr. of* 2 *dehiscent many-seeded cocci*; seeds oblong and winged. 10 species, in tropical Asia and North America; 7 in China. (Greek; *adinos*, crowded; in reference to the flowers being in heads.)

Key to the Species

Flg. heads axillary, scattered: brts. glabrous, with many lenticels: lf. blades lanceolate; petioles up to 1 cm. long ..... 1. *A. pilulifera*
Flg. heads terminal.
Flg. heads in loose terminal clusters, opposite in arrangement, the lower in leaf axils: brts. glabrous, with a few large lenticels: lf. blades ovate; petioles 1.5–3.5 cm. long ..... 2. *A. racemosa*
Flg. heads terminating leafy brs.: brts. pubescent, without conspicuous lenticels: lf. blades mostly lanceolate, on short petioles or nearly sessile ..... 3. *A. rubella*

1. **Adina pilulifera** (Lam.) Franch. (*A. globiflora* Salisb. (Lee 949). Shrub or tree, to 10 m.; fls. yellowish green, VIII. Southern and Central China; locally in An., Che., Hun., Ki., Ku. Woodland.
2. **Adina racemosa** (S.&Z.) Miq. (Lee 950). Tree, 6–10 m. high; fls. pinkish, VI–VIII. China; locally in An., Che., Hun., Hup., Ku. Woodland.

3. **Adina rubella** Hance 水楊柳 (Shui Yang Liu; Water Willow) (Lee 950). Shrub, to 3 m.; fls. white, pink, publish, VII–VIII; fr. IX. Southern and central China; locally in An., Che., Ki., Ku., Hun., Hup. Woodland, stream-side.

2. **Cephalanthus**. Linn. Buttonbush 風箱樹屬 (Fêng Hsiang Shu Shu)

Shrubs or small trees: stipules triangular and interpetiolar: *fls.* small, 4-*merous*, *in* axillary *globose heads*; corolla with a long slender tube; stamens included; style long-exserted; stigma capitate: *fr. of each fl. dividing into two* 1-*seeded nutlets*. 6 species, in Asia, Africa and North America; one in China. (Greek: *kephalos*, head and *anthos*, flower.)

1. **Cephalanthus occidentalis** Linn. 風箱樹 (Fêng Hsiang Shu; Wind-box-bellows Tree) (R.M.824). Deciduous shrub or tree, to 5 m.; fls. 4-merous, cream-white, VII–IX. North America and eastern Asia; locally in Che., Hun., Ki., Ku. Woodland.

3. **Uncaria** Schreb. 鈎藤屬 (Kou T'êng Shu)

Shrubs, climbing by hooked peduncles, with *fls. in globular heads*; corolla funnel-shaped; stamens with short filaments; anthers with 2 basal bristles; stigma capitate: fr. a 2-valved *capsule with many winged seeds*. 30 species, mostly in tropical Asia; 6 in China. (Latin: *uncus*, hook; the old peduncles being converted into hooked axillary spines.)

1. **Uncaria rhynchophylla** Miq. 鈎藤 (Kou T'êng; Hook Vine) (JLSB33:89). Woody vine; fls. greenish cream-colored, V–VIII; fr. VIII–X. Japan, southern China; locally in Ki. Forest. Fig. 345.

4. **Morinda** Linn. 羊角藤屬 (Yang Chio T'êng Shu)

Shrubs, sometimes climbing, or trees, with opposite lvs. and connate or sheathing stipules: *fls. in* umbellately arranged *head-like clusters*; calyx truncate or obscurely 4–7-lobed: ovary 2–4-celled, developing in *fr.* as many 1-seeded nutlets buried in the *fleshy* syncarp. About 40 species, in the Old World and the Pacific Islands; 5 in China.

1. **Morinda umbellata** Linn. 羊角藤 (Yang Chio T'êng; Goat-horn Vine) (Be.F.159). Diffuse climbing shrub; fls. white, in head-like clusters, V; fr. yellow, IX. Southeastern Asia to Australia; locally in Che., Hun., Ki. Woodland.

5. **Damnacanthus** Gaertn. f. 伏牛花屬 (Fu Niu Hua Shu)

Ours a brg. *shrub with slender spines* at nodes, 1 for each lf., small sub-sessile lvs. and small white axillary *fls.*, *solitary or in prs.*; corolla funnel-shaped, hairy in the throat; anthers exserted: fr. a small globose drupe with 1–4 nutlets. 2–3 species, in eastern Asia. (Greek: *damnao*, to conquer, and *acanthos*, a spine; in reference to the strong opposite thorns.)

1. **Damnacanthus indicus** Gaertn. 伏牛花 (Fu Niu Hua; Prostrate-cow Flower) (Mak.F. 114). Shrub, to 1 m.; fls. white, IV–V; fr. red, II. Eastern Asia; locally in Che., Hun., Hup., Ki., Ku. Cultivated, ornamental. Fig. 346.

6. **Emmenopterys** Oliv. 香果樹屬 (Hsiang Kuo Shu Shu)

Unarmed deciduous *trees* with petiolate coriaceous lvs. and caducous stipules: *fls.*

white, 5-merous, *in terminal corymbs*, at least one fl. in *each corymb subtended by a white foliaceous persistent bract*; calyx ciliate, deciduous; style filiform: capsule woody, dehiscent; seeds numerous, with a finely reticulate wing. 2 species, in eastern Asia: one in China. (Greek: *emmeno*, persist, and *pteryx*, wing; referring to the persistent wing-like calyx-lobe.)

1. **Emmenopterys henryi** Oliv. 香果樹 (Hsiang Kuo Shu; Fragrant-fruit Tree) (Lee 952). Tree, to 25 m.; fls. white, VI–VIII; fr. VII–IX. Southern and central China; locally in An., Che., Hun., Hup., Ki. Forest.

7. **Gardenia** Ellis 黃梔子屬 (Huang Chih Tzŭ Shu)

Erect *shrubs* or trees, sometimes spiny, (not ours) with *large showy* white or yellow fragrant solitary or fascicled *fls.*; calyx tube sometimes lobed or winged, persistent; corolla tube much exceeding the calyx, the lobes contorted or spreading: fr. coriaceous or fleshy, many-seeded, in our species *tipped by* 5 *slender calyx lobes*. 60 species, in tropical and subtropical parts of the eastern hemisphere; one in China. (In honor of Alexander Garden, a physician of Charleston, South Carolina, a correspondent of Linnaeus.)

1. **Gardenia jasminioides** Ellis (*G. florida* Linn.; *G. augusta* (L.) Merr.) Cape Jasmine 黃梔子 (Huang Chih Tzŭ; Yellow Gardenia) (B.M.933). Bushy evergreen shrub, to 2 m.; fls. white, fragrant, VI. China; locally in An., Hun., Hup., Ki., Ku. Planted, ornamental. Fig. 347.

8. **Serissa** Comm. 六月雪屬 (Liu Yüeh Hsüeh Shu)

Brg. *bushy shrubs* with small (1–4 cm. long) subsessile lvs.; *stipular sheaths armed with* 1–3 *stiff bristles*: fls. axillary, small, white, sessile, solitary or fascicled; bracts and calyx lobes sometimes bristle-tipped; corolla segments 3-lobed; stamens 4–6, inserted on the corolla tube: fr. a subglobose 2-seeded berry or capsule. 2 species, in eastern Asia; both of them in China. (Name given by Dioscorides; meaning unknown.)

Key to the Species

Corolla tube more than 2×the calyx; calyx teeth 1–1.5 mm. long: bracts not bristle-tipped ..... 1. *S. foetida*

Corolla tube about equal to the calyx; calyx teeth 3–4 mm. long, linear-subulate: bracts bristle-tipped ..... 2. *S. serissoides*

1. **Serissa foetida** (L.f.) Lam. 六月雪 (Liu Yüeh Hsüeh; June Snow) (B.M.930). Shrub, to 1 m.; fls. white and purple, VII. Japan, Korea, China, Indo-China; locally in Hup., Ki., Ku. Brushland, rare.
2. **Serissa serissoides** (DC.) Druce (*S. democritea* Baill. ex Franch.; *Democritea serissoides* DC.; *Leptodermis nervosa* Hutchins.) 滿天星 (Man T'ien Hsing; Stars-all-over-the-sky) (Fra.D.154; AA.J.8:22). Shrub, to 1 m.; fls. white, VII–VIII. China; locally in An., Che., Hon., Ki., Ku. Brushland, common.

9. **Tarenna** Gaertn. 達倫木屬 (Ta Luen Mu Shu)

Trees and shrubs with comparatively large (5–15 cm. long) opposite petiolate lvs., and with stipules, bracts and calyx lobes unarmed: *infl. in terminal many-fld. corymbs*; corolla funnel-form, the lobes twisted in bud; stamens on the corolla-mouth, sessile or

nearly so; anthers linear, exserted; style exserted: fr. a 2-celled berry or capsule. About 40 species, in tropical Asia; 10 in China. (The Ceylonese name of the shrub.)

1. **Tarenna mollissima** (H.&A.) Robins. (*Stylocoryne mollissima* (H.&A.) Benth.; *Webera mollissima* (H.&A.) Benth.) (Be.F.156). Shrub, to 3 m.; fls. white, fragrant, VI–VII; fr. black, IX–X. Southern and Central China; locally in Che., Hun., Ki. Forest.

10. **Randia** Linn. 茜草樹屬 (Ch'ien Ts'ao Shu Shu)

Shrubs or trees, ours unarmed: lvs. opposite, or with one of the pr. arrested: *fls.* in *axillary* or leaf-opposed clusters; corolla funnel-form or campanulate, 5-lobed; lobes twisted in the bud; stamens 5; *anthers linear*, subsessile, exserted; ovary 2-celled; *fr.* a *black* globose or ellipsoid many-seeded berry. 100 species, in tropical regions; 10 or more in China. (After Isaac Rand (d.1743), English horticulturist.)

Key to the Species

Calyx-teeth acutely pointed; cymes few-fld. ..... 1. *R. henryi*
Calyx shallowly lobed or truncate; cymes many-fld. ..... 2. *R. cochinchinesis*

1. **Randia henryi** Pritz. (*R. acutidens* Hemsl. & Wils.) (Di.F.581;H.-M.7:1020). Shrub or tree, to 3 m.; fls. white, VII; fr. black, X. Central and eastern China; locally in Che., Hun., Hup., Ki. Woodland.
2. **Randia cochinchinensis** (Lour.) Merr. (*R. densiflora* (Wall.) Benth.; *R. oppositifolia* (Roxb.) Koord.; *R. racemosa* (Cav.) F.-Vill.) (Be.F.155;M.L.365). Shrub or tree, to 10 m.; fls. white, VII; fr. black, X. South China, Malaya, Philippines; locally in Che., Ki. Forest.

11. **Prismatomeris** Thwaites 三角瓣花屬 (San Chio Pan Hua Shu)

Shrubs with opposite lvs. and cuspidate stipules; *fls.* in *axillary* fascicles; corolla tube cylindric; limb 5-parted; segments valvate, thickened, prismatic, excavated at the base; *stamens* 5, *included*; *anthers linear* attached basally to the corolla tube by short filaments; style linear, with 2 divergent lobes: *fr.* a 1–2-seeded *red* berry. 4–5 species, in southeastern Asia and Malaya; 2–3 in China.

1. **Prismatomeris henryi** (Lévl.) Rehd. (*P. brevipes* Hutchins.) (Pl.W. 3: 413; AA.J. 16: 328). Shrub, 2–3 m. high; fls. white, V; fr. red, X. Central and southwestern China; locally in Ki. Forest shade.

12. **Lasianthus** Jack 鷄屎樹屬 (Chi Shih Shu Shu; Chicken-excrement Shrub Genus)

Shrubs with small fls. in axillary clusters; *calyces and axes of the infl. pubescent*; corolla white, funnel-form, hairy at the throat; *anthers oblong*, included, often apiculate; ovary 4–9-celled; stigmas 3–9: *fr. blue*, a drupe with 3–9 one-seeded triangular nutlets. 80 species, mostly in tropical Asia; 10 in China. (Greek: *lasios*, wooly, and *anthos*, flower.)

1. **Lasianthus hartii** Franch. (BSBF 46: 209). Shrub, to 2 m.; fls. white, VII; fr. dark blue, X. Southern and central China; locally in Che., Hun., Hup., Ki. Woodland.

13. **Tricalysia** A. Rich. 三萼属 (San O Shu)

Shrubs or trees with opposite short-petiolate lvs.; fls. in axillary clusters, each fl. subtended by one or two whorls of *pubescent* calyx-like bracts outside the calyx; *corolla campanulate*; the lobes twisted in the bud; stamens inserted on the corolla tube; *anthers oblong*, nearly sessile: fr. a 2-celled-several-seeded red leathery berry. 40 species, in Africa, Asia, Malaya; 5 in China.

1. **Tricalysia lutea** Hand.-Mazz. (H.M. 7: 1021). Glabrous (except the fls.) trees or shrubs; fls. yellow, V; fr. red, X–XII. Southern and central China; locally in Che., Hun., Ki. Forest.

14. **Paederia** Linn. 鸡矢藤属 (Chi Shih T'êng Shu)

Twining shrubs, sometimes polygamo-dioecious, with herbaceous brs. and *large lvs.* which give off a foetid odor when crushed, and with small deciduous stipules: fls. small, 4–5-merous, in axillary or terminal paniculate cymes; corolla pubescent; stamens included; style deeply 2-parted: *fr. dry*, the thin exocarp breaking away from the 2 compressed nutlets. 20 species, in tropical and subtropical Asia and America; 2 in China. (Latin: *paedor*, bad smell; referring to the foliage when bruised.)

1. **Paederia scandens** (Lour.) Merr. (*P. chinensis* Hance; *P. foetida* Thunb., not Linn.; *P. tomentosa* Maxim., not Linn.) 鸡矢藤 (Chi Shih T'êng; Chicken-excrement Vine) (R.M. 825). Deciduous climbing shrub; fls. whitish, with purple eye, VII–VIII. China, Japan, Korea; locally in An., Hun., Hup., Ki., Ku. Woodland. Fig. 348.

15. **Thysanospermum** Benth. 盾叶木属 (Tun Yeh Mu Shu)

Woody vine with axillary solitary white fls.; calyx lobes and bracts not bristle-tipped; corolla tube slender, the segments entire; anthers included; *style entire, club-shaped at the top*, exserted; ovary 2-celled: *fr. a* nearly globular capsule with winged seeds. One species, in China. (Greek: *thysanos*, fringed, and *sperma*, a seed; referring to the winged seeds.)

1. **Thysanospermum diffusum** Champ. ex Benth. 盾叶木 (Tun Yeh Mu; Shieldleaf Tree) (Be.F. 146). Trailing shrub; fls. white, or cream-yellow, VI–VII; fr. a capsule, VII–VIII. Central and southern China, Formosa; locally in An., Che., Hun., Hup., Ki. Brushland.

16. **Ophiorrhiza** Linn. 蛇根草属 (Shê Kên Ts'ao Shu)

Low perennial *herbs*, rarely shrubs, with *small opposite lvs.* and small *fls.* secund on the brs. of axillary or *terminal* (ours) dichotomous cymes; disk large, 2-lobed: fr. a coriaceous compressed capsule with many minute seeds. 50 species, in tropical Asia, Australia and Polynesia; 6 in China. (Greek: *ophis*, a serpent, and *rhiza*, root.)

1. **Ophiorrhiza japonica** Blume (*O. eyrei* Champ. ex Benth.) 蛇根草 (Shê Kên Ts'ao; Snake-root Herb) (Be.F. 147; F.H.E. 1: 378). Ascending herb; fls. white or pink, terminal, IV. Southern and Central China; locally in An., Hun., Hup., Ki. Damp ravines.

17. **Hedyotis** Linn. 涼喉茶属 (Liang Hou Ch'a Shu; Cool-throat-tea Genus)

Herbs with slender stems, *small lvs.* and white or lilac 4-merous *fls.* in *axillary* clusters or solitary; style filiform, with 2-lobed stigma; fr. dry, sometimes indehiscent. 80 species, in tropical Asia; 20 in China. (Greek: *hedys*, sweet, and *ous*, *otas*, ear; the leaves have been compared to ears.)

1. **Hedyotis chrysotricha** (Palabin) Merr. (*Oldenlandia chrysotricha* (Palabin) Chun; *Anotis chrysotricha* Palabin) (Bu.HB.II. 6: 20). Creeping annual; fls. axillary, white, pink or bluish, VII–VIII. Southeastern Asia and Australia; locally in Che., Ki., Ku. Damp banks.

18. **Rubia** Linn. 茜草属 (Ch'ien Ts'ao Shu)

Perennial *herbs*, sometimes shrubby at the base, often stiff and hispid or prickly, with *verticillate lvs.* and small 5-*merous fls.* in axillary or terminal cymes: without involucre: *fr. fleshy.* 40 species, in Eurasia, South Africa and South America; 3 in China. (Latin: *ruber*, red; referring to the color of the dye extracted from the root of the madder plant, *R. tinctorium*.)

1. **Rubia cordifolia** Linn. 茜草 (Ch'ien Ts'ao) (Mak.F. 108). Climbing herb; fls. white, 5-merous, VIII–IX; fr. black, fleshy, X. Eastern Asia, tropical Africa; locally in An., Che., Hun., Ki., Ku. Brushland. Fig. 349.

19. **Galium** Linn. Bedstraw 猪殃殃属 (Chu Yang Yang Shu)

Slender *herbs*, mostly with square stems, often barbed, with *verticillate lvs.* and small 4- (rarely 3-) *merous fls.* in axillary or terminal panicles: *fr. dry*, 2-seeded: roots often containing a red dye. 220 species, widely distributed; 11 in China. (Greek: *gala*, milk, which is curdled by some species of the genus.)

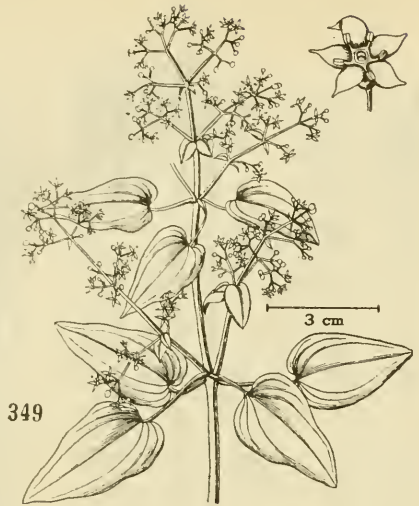
Key to the Species

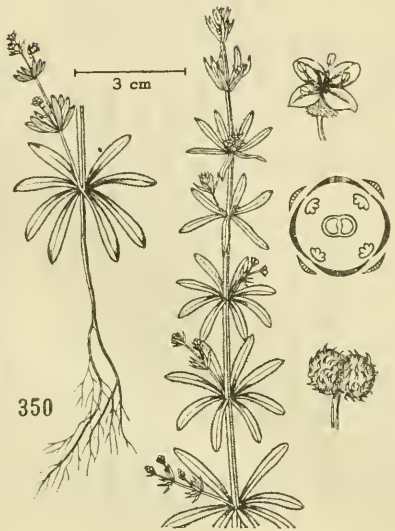
Lvs. 4 in a whorl	1.	*G. bungei*
Lvs. 6–8 in a whorl.		
Stem with backward-pointing prickles: fls. white, in 1–3-fld. panicles: annual	2.	*G. aparine*
Stem smooth: fls. yellow, in dense panicles: perennial	3.	*G. verum*

1. **Galium bungei** Steud. (*G. gracile* Bunge, non Wallr.) 四葉葎 (Ssŭ Yeh Lü; Four-leaved Humulus) (Mak.F. 110). Ascending herb, to 3 dm.; fls. white, V–VII. China, Japan; locally in An., Hun., Hup., Ki. Brushland, woodland.
2. **Galium aparine** Bunge Cleavers 猪殃殃 (Chu Yang Yang; Pig Calamity) (G.M. 1321). Weak-stemmed herb, to 0.5 m.; fls. white, III–V; stems recurved prickly. Eurasia, North Africa, North America; locally in An., Hun., Hup., Hon., Ku. Roadsides, field margins. Fig. 350.
3. **Galium verum** Linn. Yellow Bedstraw 松葉草 (Sung Yeh Ts'ao; Pine-needle Herb) (G.M. 1323). Erect herb, to 1 m.; fls. yellow, V–VIII. Eurasia, North America; locally in An., Ku. Roadsides, grassland.

163. **CAPRIFOLIACEAE** Honeysuckle Family 忍冬科 (Jên Tung K'o; Endure-winter-evergreen Family)

Shrubs, small trees, rarely herbs, with *opposite* mostly *estipulate lvs.* and perfect





349. Rubia cordifolia
350. Galium aparine

351. Sambucus sieboldiana
352. Viburnum plicatum

353. Lonicera japonica
354. Abelia zanderi

4–5-merous fls.; corolla gamopetalous, regular or irregular; stamens on the corolla tube; ovary inferior, 1–5- (rarely 8-) celled: fr. baccate, drupaceous, capsular or an achene. 13 genera with 400 species, mostly in north temperate regions; 11 genera and 220 species in China.

Key to the Genera

A. Lvs. pinnately compound ..... 1. *Sambucus*
AA. Lvs. simple.
  B. Fr. fleshy, drupaceous or berry-like.
    Corolla rotate, regular: fr. drupaceous..... 2. *Viburnum*
    Corolla tubular, often irregular: fr. berry-like..... 3. *Lonicera*
  BB. Fr. dry, a capsule or an achene.
    Fr. an a chene: calyx lobes enlarged in fr. ..... 4. *Abelia*
    Fr. a capsule: calyx lobes not enlarged in fr. ..... 5. *Weigela*

1. **Sambucus** Linn. Elder 接骨木屬 (Chieh Ku Mu Shu)

Deciduous shrubs or small trees, rarely herbs, with stout pithy brs. and *pinnate lvs.*: *fls.* small, *regular*, 5-*merous*, in large terminal corymbs or panicles; corolla rotate: stamens with short filaments; stigmas 3: *fr. a* berry-like *drupe* with 3–5 one-seeded nutlets. 20 species, in temperate and subtropical regions; 7 in China. (Old Latin name of the Elder.)

Key to the Species

Infl. flat: young brs. with white pith.
  Fr. yellow..... 1. *S. javanica*
  Fr. black ..... 2. *S. nigra*
Infl. subpyramidal: young brs. with yellow pith: fr. red..... 3. *S. sieboldiana*

1. **Sambucus javanica** Reinw. ex Blume (*S. chinensis* Lindl.) 蒴藿 (Shuo Huo) (H.F. 3:2). Shrub, to 2 m.; fls. white, VI–VIII; fr. yellow, IX–X. Southeastern Asia; locally in An., Che., Hun., Ki., Ku. Moist banks.
2. **Sambucus nigra** Linn. European Elder (R.M. 828). Shrub or tree, to 10 m.; fls. yellowish white, V–VI; fr. black. Europe, northern Africa, western Asia; locally in Ku. Planted, ornamental.
3. **Sambucus sieboldiana** Graebn. 接骨木 (Chieh Ku Mu; Bone-set Wood) (R.M. 830). Shrub or tree, to 6 m.; fls. yellowish white, IV–V; fr. red, VII–IX. Japan, China; locally in Hup., Ki., Ku. Woodland. Fig. 351.

2. **Viburnum** Linn. Arrow Wood 繡球花屬 (Hsiu Ch'iu Hua Shu)

Shrubs or small trees with *simple lvs.* and small white or pinkish *regular* 5-*merous fls.* in umbel-like or paniculately compound cymes; *corolla* usually *rotate*: *fr. a drupe* with a one-seeded usually compressed stone. 120 species, in Eurasia, northern Africa and America; 70 in China. (The old Latin name of *X. lantana.*)

Key to the Species

a. Lvs. mostly 3-lobed and coarsely dentate: cymes with enlarged sterile marginal fls.: fr. scarlet..... 1. *V. sargentii* f.*glabra*

aa. Lvs. not lobed.
  b. Cymes with enlarged sterile marginal fls., or with all fls. enlarged and radiate: fr. black.

Lateral veins of the lf. curving and anastomosing before reaching the margin ..... 2. *V. macrocephalum* f. *keteleeri*

Lateral veins of the lf. (or their evident brs.) straight and prominent to the margin, ending in points of the teeth.
Winter buds scale-covered ..... 3. *V. plicatum* f. *tomentosum*

Winter buds naked, not scale-covered..... 4. *V. sympodiale*

bb. Cymes without sterile marginal fls.
c. Infl. paniculate, broadly conical, with a main central axis: fr. red, becoming black..... 5. *V. odoratissima*
cc. Infl. umbellate, more or less flat-topped.
d. Young stems and axes of the mature fruiting infl. glabrous: fr. red.
Lvs. lanceolate, usually darkened in drying.... 6. *V. setigerum*
Lvs. ovate to orbicular-ovate or broadly obovate, not darkened in drying ..... 7. *V. lobophyllum*
dd. Young stems and/or axes of the frtg. infl. more or less pubescent.
e. Lateral veins anastomosing before reaching the lf. -margin; lf. -margins entire or irregularly and weakly serrate or dentate: fruit black.
Lvs. membranous, deciduous, sparsely stellate-pubescent on both surfaces; margins finely and irregularly serrate: fr. ellipsoid, 8–12 mm. long..... 8. *V. schensianum*
Lvs. coriaceous, evergreen, pubescent on veins beneath; margins entire or somewhat wavy: fr. ovoid, 7–8 mm. long..... 9. *V. tinus*
ee. Lateral veins or their evident branches extending to the lf. -margin and terminating in short teeth; lf. -margins clearly serrate or dentate.
f. Winter buds naked, not scale-covered: lateral veins not running straight to the teeth on the lf. -margin, but their evident branches terminating in serration-teeth.
Fls. large, salverform; tube of corolla about 10 mm. long ..... 10. *V. carlesii*
Fls. small, campanulate-rotate; lobes of corolla longer than the tube; tube 1–1.5 mm. long..... 11. *V. veitchii*
ff. Winter buds scale-covered: lateral veins running straight to the teeth on the lf.-margin, some of them with no conspicuous brs.
Petioles 1–5 mm. long, with persistent subulate stipules ..... 12. *V. erosum*
Petioles 5–18 mm. long, without persistent stipules.
Lf. -blades broadest above the middle; tips often acuminate or cuspidate.. 13. *V. dilatatum*
Lf. -blades broadest below the middle; tips acute or obtuse, but not abruptly pointed ..... 14. *V. hirtulum*

1. **Viburnum sargentii** Koehne f. **glabra** Komar. (*V. sargentii* Koehne var. *calvescens* Rehd.) (R.M. 842; R.B. 608). Shrub, to 4 m.; fls. white, V–VI, the marginal sterile and enlarged: fr. red, VIII–X; lvs. 3-lobed. Northeastern Asia; locally in An., Che., Hup., Ki. Woodland.
2. **Viburnum macrocephalum** Fort. f. **keteleeri** (Carr.) Rehd. Chinese Snowball 繡球花 (Hsiu Ch'iu Hua; Embroidered Ball Flower) (R.M. 835). Shrub, to 4 m.; fls. white, V–VI; fr. black, IX–X. China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland, planted ornamental.
3. **Viburnum plicatum** Thunb. f. **tomentosum** (Thunb.) Rehd. (*V. tomentosum* Thunb., non Lam.) 蝴蝶樹 (Hu T'ieh Shu; Butterfly Tree) (R.M. 835). Shrub, to 3 m.; fls. white, V–VI; fr. blue-black, VIII–IX. Japan, China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland. Fig. 352.
4. **Viburnum sympodiale** Graebn. (R.M. 835). Bush, to 3 m.; fls. white, V–VI; fr. black, IX. China; locally in An., Che., Hun., Hup., Ki. Woodland.
5. **Viburnum odoratissima** Ker (B.M. 937). Evergreen shrub, to 3.3 m.; fls. white, fragrant, V–VI; fr. red, becoming black, IX–X. India to Japan; locally in Hun., Ki. Brushland, streamside.
6. **Viburnum setigerum** Hance (*V. theiferum* Rehd.) 飯湯子 (Fan T'an Tzŭ) (R.M. 838). Shrub, to 4 m.; fls. white, V–VI; fr. red, X. Central and western China; locally in An., Che., Hun., Ki., Ku. Woodland.
7. **Viburnum lobophyllum** Graebn. (R.M. 839). Shrub, to 5 m.; fls. white, VI–VII; fr. red, IX–X. Central and western China; locally in An., Hup., Ki. Thickets.
8. **Viburnum schensianum** Maxim. (R.M. 833). Slender-branched shrub; fls. white, V–VI; fr. blue-black, ellipsoid, IX. Northern and central China; locally in Ku. Thickets.
9. **Viburnum tinus** Linn. Laurestinus 地中海忍冬 (Ti Chung Hai Lên Tung) (B.M. 937). Evergreen shrub, to 3 m.; fls. white or pinkish white; fr. black. Introduced from Mediterranean region; locally in Ku. Planted, ornamental.
10. **Viburnum carlesii** Hemsl. (R.M. 832). Shrub, to 1.5 m.; fls. white or pinkish, fragrant, IV; fr. blue-black; lvs. irregularly toothed. Introduced from Korea; locally in Ku. Planted, ornamental.
11. **Viburnum veitchii** C. H. Wright (R.M. 833). Shrub, to 2 m.; fls. white, V–VI; fr. black, IX. Central China; locally in Ku. Thickets, woodland.
12. **Viburnum erosum** Thunb. 小葉莢蒾 (Hsiao Yeh Ts'ê Mi) (R.M. 840) Shrub, to 2 m.; fls. white, V–VI; fr. red, IX. Japan, China; locally in An., Che., Ki., Ku. Woodland.
13. **Viburnum dilatatum** Thunb. 莢蒾 (Ts'ê Mi) (R.M. 839). Shrub, to 3 m.; fls. white, V–VI; fr. scarlet, IX–X. Japan, China; locally in An., Che., Hon., Hun., Hup., Ki., Ku. Woodland.
14. **Viburnum hirtulum** Rehd. (Sa.T. 2: 115). Shrub, 2–3 m. high; fls. white; fr. red. Southern and central China; locally in Ki. Woodland.

3. **Lonicera** Linn. Honeysuckle 金銀花属 (Chin Yin Hua Shu)

Deciduous rarely evergreen, erect or climbing shrubs with simple lvs. and 5-merous *fls. in* axillary peduncled *prs.*, each pr. with 2 bracts and 4 bractlets; *corolla tubular, often 2-lipped*; the 2 ovaries of a pr. often united; stigma capitate: *fr. berry-like*, few-many-seeded. 180 species, in the northern hemisphere; over 100 in China. (After Adam Lonitzer, a German physician and botanist, 1528–1586.)

Key to the Species

a. Erect or bushy shrubs: fr. red (or not seen).
  b. Brs. with solid pith.
    c. Corolla glabrous outside; young brts. glabrous.
      Brs. terminated by two axillary winter buds: lvs. with very short petioles; blades 3–7 cm. long, acute, setose-ciliate ..... 1. *L. fragrantissima*
      Brs. with terminal winter buds: lvs. with slender petioles; blades 6–8 cm. long, acuminate, sparingly pilose on midrib beneath ..... 2. *L. hemsleyana*
    cc. Corolla pubescent or pilose outside: young brts. pubescent or setose.
      Brts. pubescent: corolla pubescent outside: shrub, to 4 m. 3. *L. modesta*
      Brts. reflexed setose: corolla usually pilose outside: shrub, to 2 m. ..... 4. *L. standishii*
  bb. Brs. hollow; pith evanescent; brts. short-pubescent: corolla pubescent outside ..... 5. *L. maackii* f. *podocarpa*
aa. Twining and climbing, or prostrate, woody vines: fr. black (or not seen).
    None of the lvs. connate: fls. in pairs; corolla pubescent and glandular outside ..... 6. *L. japonica*
    Upper pair of lvs. connate: fls. in short-peduncled heads; corolla glabrous outside ..... 7. *L. tragophylla*

1. **Lonicera fragrantissima** Lindl. & Paxt. (R.M. 860). Shrub, to 2 m.; fls. white, III–IV; fr. red, VI. Eastern China; locally in An., Ku. Woodland.

2. **Lonicera hemsleyana** (Kuntze) Rehd. (Mo.B. 14: 112). Upright shrub; fls. yellowish. Eastern and central China; locally in An., Che., Hup., Ki. Woodland.

3. **Lonicera modesta** Rehd. (Sa.T. 2: 49). Shrub, to 4 m.; fls. white, yellowish, V; fr. red, IX. Eastern China; locally in An., Ki. Woodland.

4. **Lonicera standishii** Carrière (R.M. 860). Shrub, to 2 m.; fls. cream-white, or tinged with red, III–IV. China; locally in An., Ki, Ku. Woodland.

5. **Lonicera maackii** Maxim. f. **podocarpa** Franch. ex Rehd. 金銀木 (Chin Yin Mu; Gold-and-silver Shrub) (R.M. 868). Shrub, to 5 m.; fls. white, yellowish, V; fr. dark red, IX–X. Western and central China; locally in An., Ki., Ku. Woodland.

6. **Lonicera japonica** Thunb. 金銀花 (Chin Yin Hua; Gold-and-silver Flower) (R.M. 871). Woody vine; fls. white, yellowish, V–VII; fr. black, IX–X. Eastern Asia; locally in An., Hup., Ki., Ku. Woodland. Fig. 353.

7. **Lonicera tragophylla** Hemsl. (R.M. 875). High-climbing shrub; fls. bright yellow, VI. Western and central China; locally in An., Hup. Woodland.

4. **Abelia** R. Br. 六道木属 (Liu Tao Mu Shu)

Deciduous, rarely evergreen, shrubs with simple lvs. and fls. on peduncles, solitary or in prs., the peduncles often clustered; *sepals* 2–5, conspicuous, persistent and *accrescent*: corolla tubular to companulate, 5-lobed; stamens 4, didynamous; ovary 3-celled, but only one cell fertile: *fr. a leathery achene crowned by the persistent sepals.* 25 species, in eastern Asia, and in Mexico; 20 in China. (After Dr. Clarke Abel, physician and author in China, 1780–1826.)

Key to the Species

Fls. in panicles, abundant; corolla funnel-form.
Panicles dense; sepals 5: corolla about 15 mm. long ..... 1. *A. chinensis*
Panicles loose; sepals 2–5 on the same plant; corolla about 20 mm. long ..... 2. *A. grandiflorum*
Fls. in scattered prs.; corolla tubular or salverform; sepals 4 ..... 3. *A. zanderi*

1. **Abelia chinensis** R. Br. 糯米条 (No Mi T'iao; Flexible Strips) (R.M. 847). Deciduous shrub, to 1.5 m.; fls. white, VII–VIII; sepals 5. Central and eastern China; locally in Ki. Brushland.
2. **X Abelia grandiflora** Rehd. (*A. chinensis* X *A. uniflora*) (R.M. 846). Shrub, to 2 m.; fls. white or pinkish, VII–VIII; sepals 2–5 on same plant. Garden origin; locally in Ku. Planted, ornamental.
3. **Abelia zanderi** (Graebn.) Rehd. 六道木 (Liu Tao Mu; Six-layer Shrub) (R.M. 847). Shrub, to 3 m.; fls. VI. China; locally in An. Brushland. Fig. 354.

5. **Weigela** Thunb. 錦帶花属 (Chin Tai Hua Shu; Embroidered-belt Flower)

Deciduous *shrubs* with simple lvs. and 5-*merous fls. in axillary cymes*; *sepals not accrescent*; corolla funnel-form to campanulate; style slender; stigma capitate; *fr. a* slender 2-valved *capsule* with numerous, often winged, seeds. 12 species, in eastern Asia; 3 in China. (After C.E. von Weigel, professor and botanical author, Greifswald, Germany, 1748–1831.)

Key to the Species

Lvs. soft-pubescent beneath: ovary pubescent ..... 1. *W. japonica* var. *sinica*
Lvs. glabrous or sparsely hairy on veins beneath: ovary glabrous..... 2. *W. coraeensis*

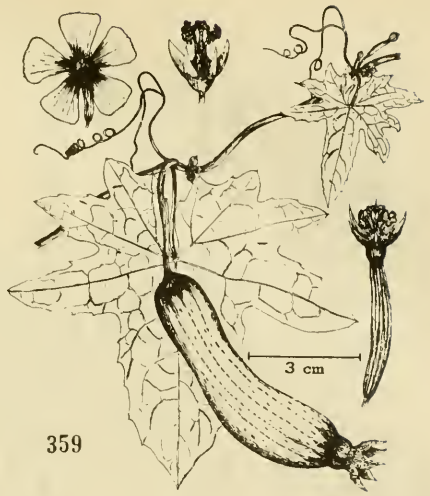
1. **Weigela japonica** Thunb. var. **sinica** (Rehd.) Bailey (*Diervilla japonica* (Thunb.) DC. var. *sinica* Rehd.) 木繡球 (Mu Hsiu Ch'iu; Woody-embroidered-ball). (R.M. 849). Shrub, to 6 m.; fls. pale pink, V–VI. Central and eastern China; locally in An., Che., Hup., Ki. Brushland. Fig. 355.
2. **Weigela coraeensis** Thunb. (*Diervilla coraeensis* (Thunb.) DC.) 海仙花 (Hai Hsien Hua; Sea-fairy Flower) (R.M. 850). Shrub, to 5 m.; fls. pale rose, whitish, V–VI, Japan; locally in Ki., Ku. Planted, ornamental.

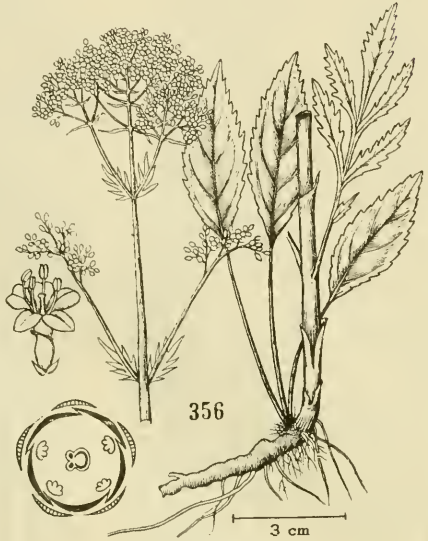
164. **VALERIANACEAE** Valerian Family 敗醬科 (Pai Chiang K'o)

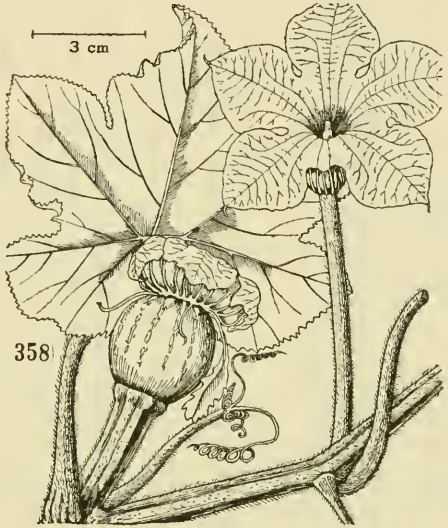
Herbs, rarely shrubs, sometimes polygamo-dioecious, with *opposite estipulate lvs.* and small gamopetalous fls. in cymose or capitate clusters; *corolla* somewhat *irregular*; *stamens* 1–3 (rarely 4), on the corolla tube; *ovary inferior*: fr. dry, one-seeded. 9 genera with 300 species, widely distributed, especially in the northern hemisphere; 3 genera and 25 species in China.

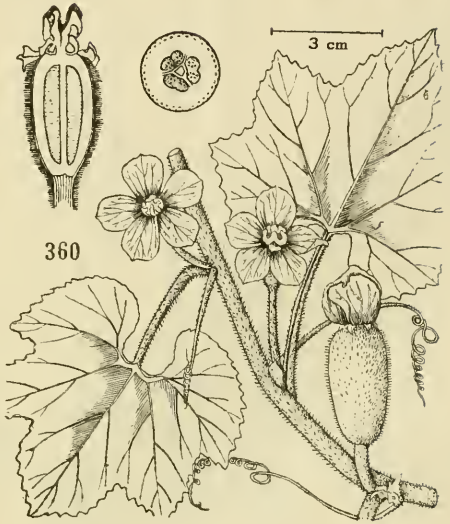
1. **Patrinia** Juss. 敗醬属 (Pai Chiang Shu)

Erect perennial herbs with entire, pinnatifid or pinnate lvs., and fls. in panicled cymes; *calyx very small in fr.*, scarcely lobed; corolla 5-lobed; *stamens* 1 (or 3–5); ovary 3-celled: fr. small, one-seeded, the barren cells nearly equal to the fertile. 12 species, Asiatic; 10 in China. (After Eugene L. M. Patrin, French traveller, and collector of plants in Siberia.)









355. Weigela japonica
356. Patrinia scabiosaefolia

357 Dipsacus japonicus
358 Cucurbita pepo

359. Luffa acutangula
360. Lagenaria siceraria

Key to the Species

Stems glabrous or pubescent, not villous: fls. yellow.
Upper stem lvs. entire or notched; some of the lower ones cleft or divided ..... 1. *P. heterophylla*
Stem lvs. conspicuously pinnately divided into narrow segments .. 2. *P. scabiosaefolia*
Stems, at least the upper portion, villous: lvs. usually not cleft; coarsely serrate: fls. white ..... 3. *P. villosa*

1. **Patrinia heterophylla** Bunge (Bunge 35). Erect herb, to 1 m.; fls. yellow, VII–VIII. Northern and eastern China; locally in An., Hun., Ki., Ku. Brushland, grassland.
2. **Patrinia scabiosaefolia** Fish. ex Link (*P. hispida* Bunge) 败醬 (Pai Chiang; Moldy Pickles) (DC.P. 4: 624; F.H.E. 1: 397). Erect herb, to 1 m.; fls. yellow, VII–VIII. Eastern Asia; locally in An., Hup., Ki., Ku. Grassland. Fig. 356.
3. **Patrinia villosa** Juss. 男郎花 (Nan Lang Hua; Gentleman's Flower) (DC.P. 4: 624). Erect herb, to 1 m.; fls. white, VIII. Eastern Asia; locally in Che., Hun., Hup., Ki., Ku. Grassland.

165. **DIPSACACEAE** Teasel Family 山萝蔔科 (Shan Lo Po K'o; Mountain-radish Family)

Herbs or dwarf shrubs with *opposite*, rarely whorled, *estipulate lvs.* and small perfect *irregular fls.*, usually *in involucrate heads*; fls. 4–5-merous, surrounded by a membranous involucel; *stamens* 4 (rarely 2–3), *distinct*, borne on the corolla; *ovary inferior*; stigmas 2: *fr. an achene*. 10 genera with 150 species, in warm temperate regions; 4 genera and 10 species in China.

1. **Dipsacus** Linn. Teasel 鍋菜属 (Kuo Ts'ai Shu)

Stout *biennial herbs*, often prickly, with stem lvs. mostly connate at the base, and with 4-*merous fls.* in ovoid terminal heads; the involucral *bracts* and those of the receptacle sharp-pointed or *spine-tipped*: fr. enclosed by the calyx-like involucel. 15 species, in Eurasia and northern Africa; 4 in China. (Greek; *dipsa*, thirst; because the connate leaf bases of some species hold water.)

1. **Dipsacus japonicus** Miq. 鍋菜 (Kuo Ts'ai; Pot Vegetable) (Mak.F. 94). Erect herb, to 2 m.; fls. white, VIII. Japan, China; locally in Ki. Grassland. Fig. 357.

166. **CUCURBITACEAE** Gourd Family 葫蘆科 (Hu Lu K'o)

Tendril-bearing herbaceous vines with alternate mostly simple lvs. and regular unisexual 5-merous fls.; petals sometimes distinct; stamens apparently 3 or 2, but with 2 prs. united, often *monadelphous by the anthers*; *ovary inferior*, usually 3-celled; stigmas 3: *fr. a pepo*. 90 genera with 700 species, mostly tropical; 16 genera and 50 species in China.

Key to the Genera

A. Lvs. pedately 3–7-foliolate ..... 1. *Gynostemma*
AA. Lvs. simple, often lobed or cleft.
B. Fr. fleshy, with a firm rind, indehiscent, mostly edible.
C. Corolla of clearly united petals ..... 2. *Cucurbita*
CC. Corolla cleft to the base or of separate petals.
D. Staminate fls. in racemes ..... 3. *Luffa*

DD. Staminate fls. axillary, not always solitary.
Tendrils branched.
Lvs. not deeply cleft: fls. white ..... 4. *Lagenaria*
Lvs. pinnatifid: fls. light yellow ..... 5. *Citrullus*
Tendrils and lvs. simple ..... 6. *Cucumis*
BB. Fr. pod-like, bladdery or fleshy, or berry-like mostly inedible.
E. Petals fimbriate, white ..... 7. *Trichosanthes*
EE. Petals or corolla not fimbriate, mostly yellow.
F. Peduncle bearing a shield-shaped bract ..... 8. *Momordica*
FF. Peduncle naked.
Fr. a conical circumscissile capsule ..... 9. *Actinostemma*
Fr. ovoid or nearly globular, indehiscent.
Stamens 3; anther cells straight: fr. 1–2 cm. long .... 10. *Melothria*
Stamens 5; anther cells curved: fr. 3–4 cm. long..... 11. *Thladiantha*

1. **Gynostemma** Blume 絞股藍属 (Chiao Ku Lan Shu)

A dioecious climbing herb with simple tendrils, *pedate lvs.* and small fls. in axillary panicles; *corolla rotate*; stamens 5; filaments connate below: fr. globose, the size of a pea, indehiscent, with 1–3 verrucose seeds. 5 species, in southern and eastern Asia; 3 in China. (Greek: *gyne*, a female, and *stemma*, a crown; ovaries are crowned by the permanent stigmas.)

1. **Gynostemma pedata** Blume 絞股藍 (Chiao Ku Lan; Tangled-stem-blue) (H.F.2:633). Climbing herb; fls. greenish, VII–VIII; fr. VIII–IX. Southeastern Asia; locally in An., Hup., Ki. Cliffs, ravines.

2. **Cucurbita** Linn. Squash 南瓜属 (Nan Kua Shu)

Coarse hispid annual monoecious vines with cordate 5-angled or -lobed lvs. and large solitary yellow fls.; calyx and corolla campanulate, the *petals clearly united*; ovary one-celled, with 3–5 placentae: *fr. fleshy*, with a firm rind, *edible*. 10 species, supposedly American; one cultivated in China. (The Latin name for Gourd.)

1. **Cucurbita pepo** Linn. Field Pumpkin 南瓜 (Nan Kua; Southern Squash) (B.M.952). Trailing annual; fls. yellow, petals clearly united, VII–VIII; fr. VIII–IX. American; locally in An., Ki., Ku. Cultivated, vegetable. Fig. 358.

3. **Luffa** Linn. Vegetable Sponge 絲瓜属 (Ssŭ Kua Shu)

Coarse monoecious annual vines with cordate 5–7-lobed or -angled lvs. and yellow *fls.*; the pistillate solitary; *the staminate in racemes*; *petals distinct*; *anthers free*: *fr.* 3-celled, at first *fleshy* and edible, becoming dry. 8 species, in the eastern tropics; 2 in China. (From *luff*, the Arabic name.)

Key to the Species

Lvs. not deeply lobed: ovary club-shaped, not tomentose, ribbed and angled ..... 1. *L. acutangula*
Lvs. deeply cleft: ovary cylindrical and tomentose, not ribbed ..... 2. *L. cylindrica*

1. **Luffa acutangula** (L.) Roxb. (B.M.953). Climbing annual; fls. yellow, VII–IX; fr. IX. Eastern tropics; locally in Ku. Cultivated, fruit. Fig. 359.

2. **Luffa cylindrica** (L.) Roem. 絲瓜 (Ssŭ Kua; Fiber Squash) (B.M.953). Climbing annual; fls. yellow, VII–IX; fr. X. Eastern tropics; locally in Hun., Ki. Cultivated, fruit.

4. **Lagenaria** Ser. 葫蘆屬 (Hu Lu Shu)

A coarse annual vine with *branched tendrils*, *ovate to orbicular cordate lvs.*, the petiole bearing 2 glands at the top, and solitary *white* showy *fls.*; anthers slightly cohering or connate: fr. fleshy, becoming dry. One species, in the Old World tropics. (Latin: *lagena*, a flask; from the shape of the fruit.)

1. **Lagenaria siceraria** (Molina) Standl. (*L. leucantha* (Duch.) Rusby) White-flowered Gourd 葫蘆 (Hu Lu) (B.M.954). Climbing annual; fls. white, VIII–IX; fr. IX–X. Eastern tropics; locally in Hun., Ki., Ku. Cultivated, fruit. Fig. 360.

5. **Citrullus** Neck. 西瓜屬 (Hsi Kua Shu)

Monoecious hispid or scabrous annual or perennial long-running vines with branched tendrils, *deeply pinnatifid lvs.* and solitary *light yellow fls.*; corolla campanulate or rotate, cleft nearly to the base; anthers free or nearly so: *fr. large*, smooth, *fleshy and edible*. 4 species, in tropical Africa and perhaps one in Asia; one cultivated in China. (Latin: diminutive of *Citrus*; from a fancied resemblance of the fruit to that of the citron tree.)

1. **Citrullus vulgaris** Schrad. Watermelon 西瓜 (Hsi Kua; Western Melon) (B.M.954). Trailing annual; fls. light yellow, VI–VII; fr. VIII–IX. Tropical and southern Africa; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, fruit. Fig. 361.

6. **Cucumis** Linn. 胡瓜屬 (Hu Kua Shu)

Hispid or scabrous monoecious annual or perennial vines with *unbranched tendrils*, *simple* 3–7-lobed or -angled *lvs.* and yellow fls.; the pistillate solitary; the staminate clustered; anthers free: *fr. fleshy and edible*, glabrous, pubescent or echinate. 30 species, in warm countries, mostly Africa; 3 in China. (The Latin name for a plant with cucumber-like odor.)

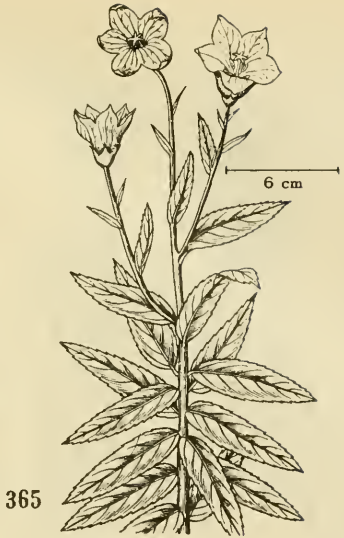
Key to the Species

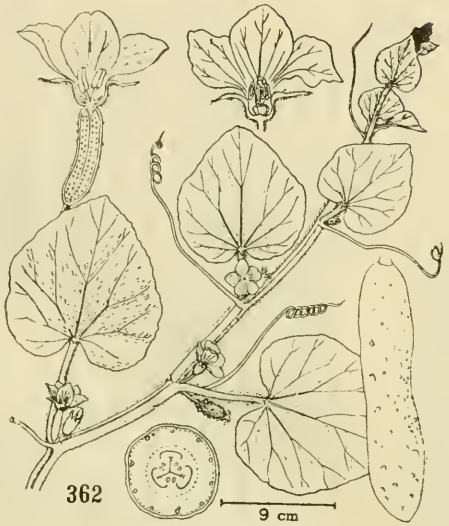
Fr. not prickly, often furrowed, with musky odor	1.	*C. melo*
Fr. prickly, often elongated, without musky odor	2.	*C. sativus*

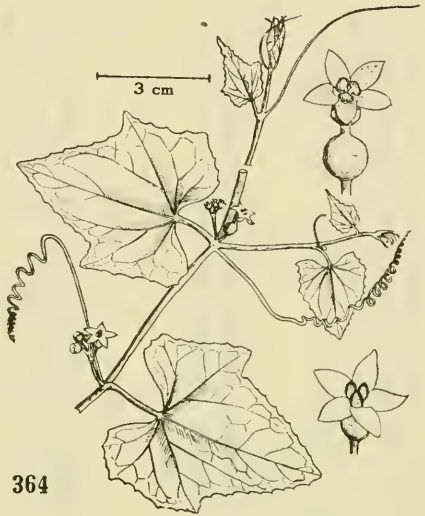
1. **Cucumis melo** Linn. Muskmelon 香瓜 (Hsiang Kua; Fragrant Melon) (B.M.955). Trailing annual; fls. yellow, VII–VIII; fr. VIII–IX. Central Asia; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, fruit.
2. **Cucumis sativus** Linn. Cucumber 胡瓜 (Hu Kua; Foreign Melon) (B.M.955). Climbing annual; fls. yellow, VI–VIII; fr. VII–IX. Southern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Cultivated, fruit. Fig. 362.

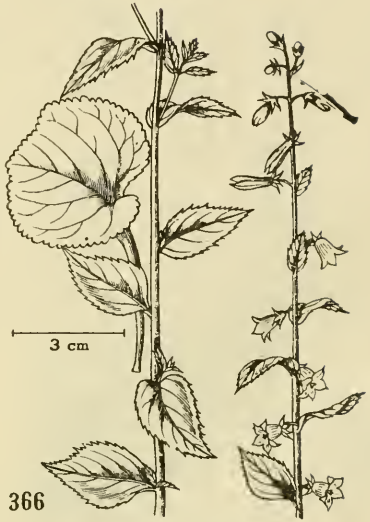
7. **Trichosanthes** Linn. 栝樓屬 (Kua Lü Shu)

Herbaceous vines with lobed lvs., sometimes tuberous roots, and *white fls.*; the staminate in racemes; the pistillate solitary; calyx long-tubular; *corolla lobes long-fimbriate*: anthers connate: *fr. fleshy*, smooth. 40 species, from India and Japan to









361. Citrullus vulgaris
362. Cucumis sativus

363. Momordica charantia
364. Melothria indica

365. Platycodon grandiflorum
366. Adenophora remotiflora

Australia; 6 in China. (Greek: *trichoma*, hair; and *anthos*, flower; from the fimbriate corolla lobes.)

1. **Trichosanthes kirilowii** Maxim. (*T. palmata* Hance) 括樓 (Kua Lü; To-include-thread) (H.F.2:606; F.H.E.1:313). Climbing herb; fls. white, VI–VII; fr. reddish, VIII–IX. Southeastern Asia, Malaya, northern Australia; locally in An., Che., Hun., Hup., Ki., Ku. Grassland, brushland.

8. **Momordica** Linn. 苦瓜属 (K'u Kua Shu)

Herbaceous vines with cordate lvs. and *yellow* or white *fls.*; the pistillate solitary (*the peduncle bearing a shield-shaped bract*); the staminate sometimes racemose; corolla cleft nearly to the base; anthers free: fr. rugose or spiny-tuberculate, dry and occasionally dehiscent at maturity. 35 species, in tropical Asia and Africa; 2 in China. (Latin: *mordeo*, to bite; because the seeds are sometimes jagged, as if bitten.)

1. **Momordica charantia** Linn. Balsam Pear 苦瓜 (K'u Kua; Bitter Squash) (B.M.956). Climbing herb; fls. yellowish, VIII–IX; fr. IX–X. Eastern tropics; locally in An., Hun., Ki., Ku. Cultivated, fruit. Fig. 363.

9. **Actinostemma** Griff. 合子草属 (Ho Tzŭ Ts'ao Shu)

A weak climbing monoecious herb with simple or 2-fid tendrils, simple lvs. and small fls. in lax axillary panicles; panicles often staminate, with a few pistillate fls, near the base (*the peduncle naked*); calyx and corolla rotate and 5-parted; stamens 5. free; connective dilated-pappilose on one side, with a narrow straight oblong anther cell on the other; ovary one-celled: *fr. ovoid-conical*, half-superior, covered with rough points, *circumscissile above the middle*; seeds corrugated, with denticulate margin. 6 or more species in Asia; 6 in China.

1. **Actinostemma lobatum** Maxim. 裂葉合子草 (Lieh Yeh Ho Tzŭ Ts'ao; A-pair-of-lobed-leaves Herb) (Mak.F.93). Climbing herb; fls. greenish, VIII–IX; fr. brownish, IX–X. Eastern Asia; locally in An., Ki., Ku. Grassland, brushland.

10. **Melothria** Linn. 馬皎兜属 (Ma P'a Êrh Shu)

Monoecious slender climbing herbs with deltoid-ovate lvs. and small mostly clustered fls.; corolla deeply 5-parted; *stamens* 3: *fr. ovoid or nearly globular*, small, glabrous or warty, *indehiscent*. 70 species, in warm countries; 3 in China. (From the Greek name of a kind of wild grape.)

1. **Melothria indica** Lour. (M.F.456). Climbing herb; fls. whitish, IX; fr. X. Southeastern Asia; locally in Che., Ki. Brushland, woodland. Fig. 364.

11. **Thladiantha** Bunge 青牛胆属 (Ch'ing Niu Tan Shu; Calf-gall-bladder Genus)

Dioecious climbing herbs with usually simple tendrils, entire or 3-parted lvs., and yellow peduncled fls.; corolla campanulate, 5-parted; *stamens* 5, *with one-celled anthers*: *fr.* ellipsoid to nearly globular, indehiscent, *with vertical ribs*; seeds many, smooth, compressed. More than 10 species, in eastern Asia; 11 in China. (Greek: *thladias*, eunuch, and *anthos*, flower; from Bunge's impression that the flowers are sterile.)

1. **Thladiantha nudiflora** Hemsl. (F.H.E.1:316). Climbing herb; fls. yellow, VI–IX; fr. VIII–IX. Central and northern China; locally in An., Hup., Ki., Ku. Grassland, brushland.

167. **CAMPANULACEAE** Bellflower Family 桔梗科 (Chieh Kêng K'o)

Herbs, sometimes climbing, *often with milky juice*: *lvs. alternate*, sometimes opposite or whorled below, estipulate: fls. solitary or scattered in spikes or racemes, 5-merous, *regular*, usually blue and showy; corolla tubular, campanulate or rotate; stamens inserted on the rim of the calyx, or at the very base of the corolla; filaments often dilated at the base; ovary inferior: *fr.* usually *capsular* and indehiscent, sometimes berry-like. 40 genera with 1,000 species, widely distributed in tropical and subtropical regions; 9 genera and 50 species in China.

Key to the Genera

A. Stems erect, not twining.
  B. Fls. large, about 5 cm. in diam., and terminal ..... 1. *Platycodon*
  BB. Fls. not over 3 cm. in diam.
    Fls. subsessile; style not surrounded by or arising through a fleshy disk ..... 2. *Campanula*
    Fls. on slender pedicels; style surrounded by a fleshy disk.
      Fls. in racemes or panicles ..... 3. *Adenophora*
      Fls. mostly solitary and terminal ..... 4. *Wahlenbergia*
AA. Stems twining ..... 5. *Codonopsis*

1. **Platycodon** A.DC. Balloon Flower 桔梗属 (Chieh Kêng Shu)

Erect perennial herb from an enlarged somewhat woody caudex, with *large terminal*, usually solitary, blue (rarely white) *fls.*; corolla open bell-shaped, with 5 or more broad lobes which are valvate in the bud and remain joined together until the fl. enlarges into a balloon-like structure 3–4 cm. in diam.; stamens much dilated at the base; stigmas 5: *capsule* 5-celled, *opening at the top* by means of valves. One species, in eastern Asia. (From the Greek terms meaning "broad bell", referring to the shape of the flowers.)

1. **Platycodon grandiflorum** (Jacq.) A.DC. 桔梗 (Chieh Kêng) (B.M.967). Erect herb, to 1 m.; fls. blue, white, VII–IX; fr. IX–X. Eastern Asia; locally in An., Ki., Ku. Grassland, brushland. Fig. 365.

2. **Campanula** Linn. Bellflower 山小菜属 (Shan Hsiao Ts'ai Shu; Mountain-vegetable Genus)

Erect, often tufted, herbs with *large* terminal or axillary *subsessile fls.*; corolla campanulate to rotate; stamens usually dilated at the base; *style not arising through a fleshy disk*: *capsule opening on the side* below the persistent calyx ring by pores or valves. 250 species, chiefly in the northern hemisphere, many in Europe; 10 in China. (Latin: diminutive of *campana*, bell; from the shape of the corolla.)

1. **Campanula medium** Linn. Canterbury Bells 風鈴草 (Fêng Ling Ts'ao; Wind-bell Herb) (B.M.962). Erect herb, to 1.5 m.; fls. violet to blue, V–VII. Southern Europe; locally in Ku. Planted, ornamental.

3. **Adenophora** Fisch. 薺苨属 (Chi Ni Shu)

Erect perennial herbs, often with thickened caudices, and with alternate or verticillate lvs.: *fls.* blue or white, *in racemes or panicles*, *on slender pedicels*; stamens free from the corolla; filaments dilated, often ciliate at the base; *style* long exserted,

surrounded at the base by a fleshy disk: capsule crowned by the calyx lobes, dehiscent. 40 species, in Eurasia; 16 in China. (From the Greek terms meaning "gland-bearing".)

Key to the Species

Fls. large, about 2 cm. long: stem lvs. not whorled.
Stem lvs. broadly cuneate to ovate-cordate ..... 1. *A. remotiflora*
Stem lvs. lanceolate, the basal ones ovate-cordate to reniform .... 2. *A. stricta*
Fls. small, about one cm. long: stem lvs. verticillate ..... 3. *A. verticillata*

1. **Adenophora remotiflora** Miq. 薺苨 (Chi Ni; Shepherd's-purse-harebell) (C.Pe.A. 3:78). Erect herb, to 1.5 m.; fls. blue, white, VII–IX. Northeastern Asia; locally in An. Grassland. Fig. 366.
2. **Adenophora stricta** Miq. 杏葉沙參 (Hsing Yeh Sha Shên) (C.Pe.A.3:81). Erect herb, to 1 m.; fls. blue, VII–X. Central China, Japan; locally in An., Ki., Ku. Grassland.
3. **Adenophora verticillata** Fisch. 沙參 (Sha Shên) (C.Pe.A.3:81). Erect herb, to 1.5 m.; fls. blue, VII–VIII. Eastern Asia; locally in An., Ki., Ku. Grassland.

4. **Wahlenbergia** Schrad. 細葉沙參属 (Hsi Yeh Sha Shên Shu)

Annual or perennial herbs with alternate or opposite lvs., and *flg. peduncles terminal* or opposite the lvs., *mostly solitary* (ours); corolla campanulate, sometimes cleft to the base; stamens free from the corolla; anthers oblong, free; *style surrounded by a fleshy disk*; stigma with 3 narrow lobes: capsule 2–3–valved inside the persistent calyx teeth; seeds numerous, minute. 80 species, mostly of the southern hemisphere; 3 in China. (After Dr. George Wahlenberg, 1780–1851, Swedish botanist.)

1. **Wahlenbergia gracilis** A.DC. (*W. agrestis* A.DC.) 細葉沙參 (Hsi Yeh Sha Shên; Fine-leaved *Adenophora verticillata*) (Be.F.197; F.H.E.2:4). Erect or decumbent annual, to 3 dm.; fls. blue, VII–VIII. Subtropical Asia, Africa, and Australia; locally in An., Hun., Hup., Ku. Waste places, open hills. Fig. 367.

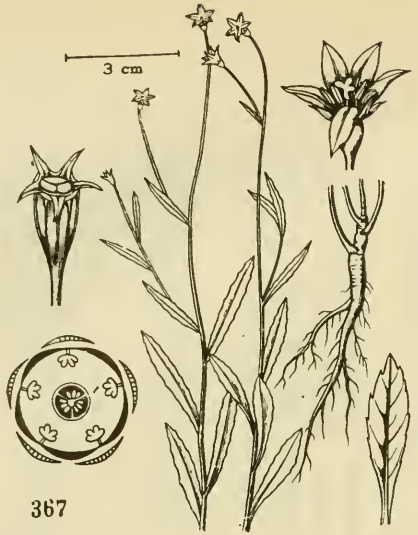
5. **Codonopsis** Wall. 羊乳属 (Yang Ju Shu)

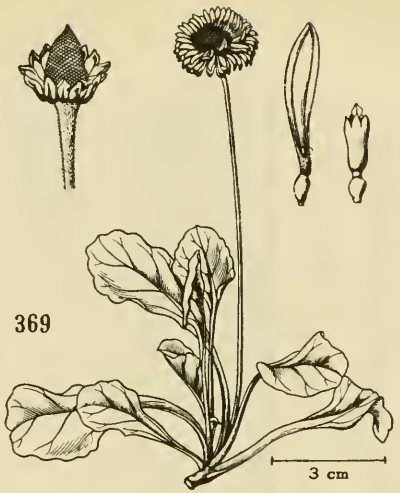
Twining perennial herbs, often from tuberous roots, with mostly alternate lvs., and fls. on axillary or terminal solitary peduncles; corolla campanulate, with 5 short lobes; *stamens on the margin of the disk*; ovary inferior, with a superior vertex: capsule 3–valved, with many smooth brown seeds. 12 species, in eastern Asia; 8 in China. (Greek: *co-donop-sis*, bell-like.)

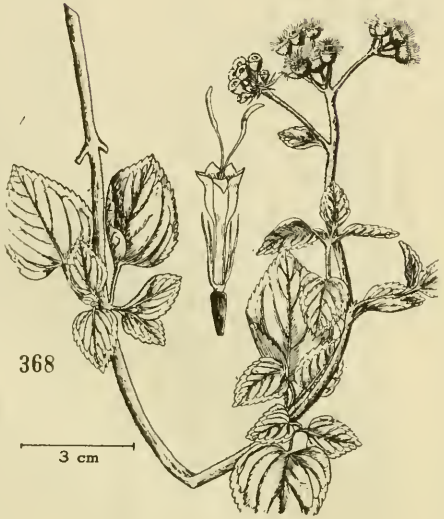
1. **Codonopsis lanceolata** Benth. & Hook. f. 羊乳 (Yang Ju; Goat's Milk) (Mak.F.81). Twining herb; fls. purple, VIII. Eastern Asia; locally in An., Che., Hun., Hup., Ki. Brushland, woodland. Fig. 371.

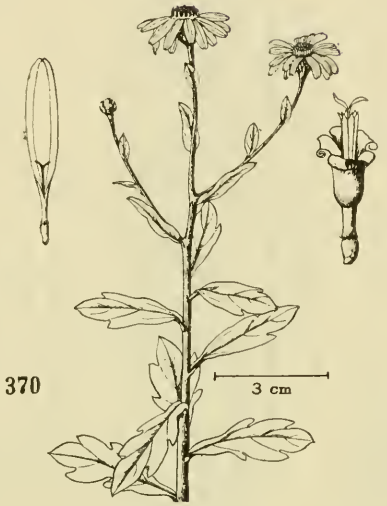
168. **LOBELIACEAE** Lobelia Family 山梗菜科 (Shan Kêng Ts'ai K'o)

Herbs (rarely woody plants) with acrid *milky juice*, *alternate lvs.* and *scattered* 5–*merous irregular fls.*; corolla often 2–lipped; *stamens* free from the corolla and *united* into a tube about the style *by their anthers* and often also by their filaments; *ovary inferior*; stigmas fringed: fr. many-seeded, capsular or baccate. 20 genera with 600 species, cosmopolitan; 2 genera and 7 species in China.









367. Wahlenbergia gracilis
368. Ageratum conyzoides

369. Bellis perennis
370. Aster indicus

371. Codonopsis lanceolata
372. Erigeron linifolius

1. **Lobelia** Linn. 山梗菜屬 (Shan Kêng Ts'ai Shu)

Herbs, a few tropical species somewhat woody, with fls. mostly in bracteate racemes; *corolla* more or less 2-lipped, with a straight *tube split down one side to the base*; at least 2 anthers hairy at the tip: fr. a many-seeded pod, opening at the top. 250 species, cosmopolitan; 6 in China. (After Matthias de l'Obel, a Flemish botanist and author, 1538-1616.)

Key to the Species

Stems slender, decumbent or prostrate: fls. blue or pinkish, 1–2 cm. long ..... 1. *L. chinensis*
Stems stout, erect, 1–2 m. tall: fls. purple to rose, about 3 cm. long .. 2. *L. pyramidalis*

1. **Lobelia chinensis** Lour. (*L. trigona* Benth., not Roxb.) 華山梗菜 (Hua Shan Kêng Ts'ai) (Be.F.196; F.H.E.2:2). Decumbent or prostrate herb, to 1.5 dm.; fls. small, blue or pink, V–VIII. Southern and east-central China; locally in An., Hun., Ki., Ku. Wet places, rice fields.
2. **Lobelia pyramidalis** Wall. (H.F. 3:426). Erect herb, to 2 m.; fls. large, reddish purple, VII–VIII. Southeastern Asia; locally in Hun., Ki. Streamsides, wet places.

169. **COMPOSITAE** Composite Family 菊科 (Chü K'o)

Herbs (ours), shrubs or trees, in one tribe with milky sap: lvs. mostly alternate sometimes opposite or whorled, simple and entire to much divided, but never truly compound: *infl. of* few-to many-fld. *heads* (rarely 1-fld.), solitary or in spikes, racemes cymes or panicles, or glomerate: *each head with an involucre* of bracts (often called phyllaries) surrounding the small regular or irregular fls. which are closely arranged on a flat, convex or concave, pitted or smooth, often bristly or scaly-bracted receptacle: the outer fls. of the *head often with* strap-shaped (ligulate) corollas, called *ray fls.* which resemble petals, giving the head the appearance of a single large fl. (heads with rays are called *radiate* or *ligulate*; those without rays are called *discoid* if all the corollas are similar and tubular or filiform, *disciform* if the outer fls. are pistillate with filiform corolla or even without corolla and the inner fls. hermaphrodite with tubular corolla); calyx tube united to the one-celled one-ovuled *inferior ovary*, the limb none, or represented by hairs, bristles or scales, called pappus; corolla 2–5-lobed, regular, ligulate, or rarely bilabiate; stamens (in the perfect fls.) as many as the lobes of the corolla and alternate with them, inserted on the corolla tube; *anthers united into a tube* around the style, which is 2-cleft or entire: *fr. an achene*, usually crowned by the pappus hairs, bristles or scales. The largest family of flowering plants. About 950 genera with 20,000 species, in all parts of the world, but most abundant in the temperate regions; 80 genera and 700 species in China.

The Compositae, except Cichorieae, have been revised, and the key to genera prepared by S. F. Blake. The text with keys for the Cichorieae was contributed by G. L. Stebbins, Jr.

Key to the Genera

A. Fls. all hermaphrodite and with flat strap-shaped 5-toothed corollas: plants with milky latex.
  B. Pappus none, or of scales, or of 2–4 stout hooks.
    Pappus of scales: fls. purple, blue or white ..... 48. *Cichorium*

Pappus none, or of 2–4 stout hooks: fls. yellow ..... 49. *Lapsana*

BB. Pappus of bristles.

C. Pappus bristles stout, plumose.

Plants glabrous or appressed-tomentose: lvs. mostly lanceolate or linear, entire: involucre large, 2–6 cm. high: plume of pappus bristles interlaced.

Involucral bracts imbricated in several series: fr. beakless ..... 52. *Scorzonera*

Involucral bracts in a single series: fr. beaked ..... 51. *Tragopogon*

Plants setose or hirsute: lvs. mostly elliptic, toothed or pinnatifid: involucre 1–1.5 cm. high: plumes of pappus bristles not interlaced ..... 50. *Picris*

CC. Pappus bristles very numerous, slender, simple.

D. Heads borne on brg., lfy. or bracteate stems.

E. Heads with 5–30 florets: pappus bristles all nearly alike, not cottony and adhesive.

Infl. cymose or corymbose: tube of corolla 1/5–1/3 as long as the ligule, glabrous or evenly scabrous.

Fr. beakless, unequally ribbed, 4 or 5 of the ribs stronger than the others: ovary with 5 or 4 vascular bundles ..... 57. *Youngia*

Fr. definitely beaked (except in *I. lanceolata*), mostly 10 (in *I. denticulata* 12–15)-ribbed; the ribs equal, prominent, often alate: ovary with 5 vascular bundles ..... 56. *Ixeris*

Infl. (in our species) racemose-paniculate: tube of corolla 1/2–1 times as long as the ligule: ovary with 2–4 vascular bundles ..... 55. *Lactuca*

EE. Heads with 75–100 or more florets: *pappus bristles of two sorts*; some straight and many-celled in cross-section; others flexuous, cottony and adhesive to clothing, etc. ..... 54. *Sonchus*

DD. Heads solitary on leafless, hollow scapes: plant acaulescent .. 53. *Taraxacum*

AA. Fls., when hermaphrodite, with the corolla tubular and regular or essentially so (or rarely bilabiate); marginal fls. of the head often pistillate or neutral (that is, without stamens or style, and with infertile ovary) and often with strap-shaped, 2–3 (–4)-toothed corolla: plants without milky latex.

F. Heads discoid or disciform (no strap-shaped ray fls.)

G. Pappus none.

H. Plant thistle-like, with spiny lvs.: corollas bright orange.. 45. *Carthamus*

HH. Plant not thistle-like, the lvs. not spiny: corollas not orange.

Plant monoecious; the pistillate heads 2-fld., in the form of a bur clothed with hooked prickles; the corolla wanting; the staminate heads in short spikes or racemes, discoid, many-fld., with an involucre of a few small bracts ..... 15. *Xanthium*

Plants not monoecious, the individual fls. of the head hermaphrodite (but the inner sometimes functionally staminate) or the outer ones pistillate.

Outer phyllaries herbaceous: achenes rather slender and elongated, narrowed into a short beak ..... 13. *Carpesium*

Outer phyllaries with scarious margins, not at all herbaceous: achenes short, not beaked ..... 31. *Artemisia*

GG. Pappus present.
I. Pappus of strongly plumose hairs or bristles (the lateral hairs many times as long as the diameter of the main hair).
J. Outer phyllaries pinnately dissected into linear spinescent divisions ..... 38. *Atractylis*
JJ. Outer phyllaries not pinnately dissected.
Lvs. with spiny teeth or lobes ..... 42. *Cirsium*
Lvs. not spiny.
Heads not in racemes: stems lfy. throughout.... 40. *Saussurea*
Heads in racemes: lvs. crowded at middle or base of stem ..... 46. *Ainsliaea*
II. Pappus not of strongly plumose hairs (if at all plumose, then with the lateral hairs only a few times as long as the diam. of the main hair, as in *Helichrysum*.
K. Lvs. with spiny teeth or lobes.
Heads 1-fld., densely crowded into solitary terminal globose glomerules about 4–5 cm. thick: pappus of many short scales..... 37. *Echinops*
Heads many-fld., not crowded into a glomerule: pappus of simple hairs..... 41. *Carduus*
KK. Lvs. not at all spiny.
L. Involucre composed of dry, scarious, papery or scaly bracts.
Heads large, 3–5 cm. in diam., not clustered; the involucre 1.5–2 cm. high, of conspicuous yellow, reddish, purple, or white bracts: plant green and essentially glabrous ..... 11. *Helichrysum*
Heads much smaller, less than 1 cm. in diam., crowded or clustered; the involucre less than 1 cm. high: plant wooly.
Involucre bright white; the bracts firm and almost papery: internodes narrowly winged throughout ..... 9. *Anaphalis*
Involucre yellowish to bright yellow; the bracts thin and scarious: internodes winged only above if at all ..... 10. *Gnaphalium*
LL. Involucre not composed of dry scarious, papery, or scaly bracts.
M. Bracts of involucre stiffly hooked at apex .... 39. *Arctium*
MM. Bracts not hooked at apex.
N. Involucre double; the outer of herbaceous bracts; the inner of membranous bracts: each fl. in the head subtended by a membranous pale ..... 25. *Bidens*
NN. Involucre otherwise: receptacle without pales (but sometimes stiffly setose).
O. Pappus of 5 acuminate paleaceous awns: involucral bracts 2-seriate, but essentially equal in length: lvs. opposite ..... 2. *Ageratum*
OO. Pappus otherwise: principal bracts of involucre either strongly graduated in length, or else equal and essentially in a single series: lvs.

alternate (except in *Eupatorium*).

P. Bracts of involucre distinctly in 2 sets; the principal ones (inner) equal, essentially in a single series; the outer (bractlets) very much shorter, or sometimes obsolete.

Lvs. palmately parted ..... 33. *Cacalia*

Lvs. pinnately parted ..... 32. *Gynura*

PP. Bracts of involucre not in 2 sets, regularly graduated in length, in 3 or more series.

Q. Lvs. opposite at least to middle of stem: pappus of equal hair-like bristles only.. 3. *Eupatorium*

QQ. Lvs. alternate: pappus not as above.

Heads small; the involucre only about 4 mm. high: pappus double; the inner of fine hair-like bristles; the outer (inconspicuous) of very short bristles: receptacle naked ..... 1. *Vernonia*

Heads medium or rather large; the involucre 1 cm. high or more: pappus of strongly graduated paleae: receptacle densely bristly.

Involucral bracts (outer ones) with dentate scarious white or purplish margins and tips: outer corollas of head enlarged and palmately lobed: lvs. mostly entire..... 44. *Centaurea*

Involucral bracts entire, mucronate-tipped, without conspicuous margin: outer corollas not enlarged: lvs. mostly pinnatifid ..... 43. *Serratula*

FF. Strap-shaped ray fls. present. (In *Centaurea* (our species) the outer corollas are enlarged and falsely ligulate. Look for it in "F." In *Gerbera* the ray corollas are actually bilabiate but the 2 inner lobes are small and inconspicuous, and it is placed in "FF.").

R. Rays white, red, blue, or violet, never yellow.

S. Pappus of numerous slender hairs (sometimes with an outer series of short more or less connate squamellae).

T. Disk corollas distinctly 2-lipped: plant scapose: achene beaked..... 47. *Gerbera*

TT. Disk corollas regular, 5-toothed: plants not scapose: achene not beaked.

U. Outer bracts of involucre herbaceous throughout, linear or spatulate, much surpassing the inner.. 6. *Callistephus*

UU. Outer bracts of involucre not herbaceous (except sometimes at tip), shorter than the inner or at most not surpassing them.

Rays (white) very short and inconspicuous, scarcely surpassing the involucre ..... 8. *Erigeron*

Rays (white or colored) conspicuous, much surpassing the involucre.

Phyllaries 2–3–seriate, essentially equal, narrowly lanceolate, acuminate, submembranous without herbaceous tip: pappus of ray fls. of small squamellae only (or rarely with a few

bristles also); that of disk fls. of both squamellae and bristles..... 8. *Erigeron* (*E. annuus*)

Phyllaries distinctly unequal and graduated, of firm texture, often with short herbaceous tip: pappus otherwise .... 7. *Aster*

SS. Pappus not of numerous slender hairs, sometimes wanting.

V. Lvs. all or mostly opposite.

W. Rays sessile, indurated and persistent on the achenes: lvs. entire: involucre strongly graduated and regularly imbricated ..... 16. *Zinnia*

WW. Rays contracted into a short but slender tube, not indurated and persistent in fr.: lvs. not entire (except in *Eclipta*): involucre not strongly graduated nor regularly imbricated.

X. Rays numerous, small, very narrow, white, about 2-seriate; the whole head little if at all over 1 cm. wide: pappus none: lvs. entire or merely toothed ..... 19. *Eclipta*

XX. Rays otherwise: pappus often present: lvs. usually pinnately divided or finely pinnatifid.

Achenes beaked: lvs. twice pinnatifid into nearly filiform segments ..... 26. *Cosmos*

Achenes not beaked, although sometimes slender: lvs. not divided into filiform segments.

Pappus of 2–4 retrorsely hispid stiff awns: heads only 2 cm. wide or less across the rays ..... 25. *Bidens*

Pappus of 2 small teeth, or none: heads about 5 cm. wide or more across the rays ..... 24. *Dahlia*

VV. Lvs. all alternate or (in one case) strictly basal.

Y. Lvs. finely dissected into segments less than 1 mm. wide: heads small, densely crowded into terminal corymbs; receptacle chaffy..... 29. *Achillea*

YY. Lvs. not finely dissected: heads otherwise; receptacle naked.

Z. Heads tiny, 4–6-fld.: lvs. few, linear or narrowly lanceolate, 5–30 mm. long: fr. oblong, narrowly 3-winged, more than twice as long as involucre, epappose..... 14. *Sheareria*

ZZ. Heads medium-sized or large, many-fld.: lvs. otherwise: fr. otherwise.

Plant scapose, the scapes 1-headed ..... 5. *Bellis*

Plants not scapose.

Involucral bracts not with scarious margin and tip: style brs. acute ..... 7. *Aster*

Involucral bracts with scarious margin and tip: style brs. truncate ..... 30. *Chrysanthemum*

RR. Rays yellow or orange, sometimes with a red, brown or purplish spot or blotch in lower part, rarely (*Gaillardia*) only the tip yellow.

A′. Pappus of fine hair-like bristles only.

B′. Principal involucral bracts in 3 or more series, unequal or subequal.
Heads small, not over 1 cm. wide, usually numerous; outer phyllaries slightly if at all herbaceous tipped, much shorter than the inner ..... 4. *Solidago*
Heads larger, about 3 cm. wide, solitary or few at tips of stems and brs.; outer phyllaries herbaceous-tipped, equalling or surpassing the inner ..... 12. *Inula*
B′B′. Principal involucral bracts in a single series, sometimes with a few small outer ones added.
Stem lvs. with conspicuously enlarged sheathing petioles, or else (*L. kaempferi*) plant subscapose and basal lvs. reniform; the blade broader than long: heads large; the disk 1.2–2.5 cm. high ..... 35. *Ligularia*
Stem lvs. not with sheathing petioles; if plant subscapose the basal lvs. obovate or oblong: heads smaller; the disk 0.5–1.5 cm. high ..... 34. *Senecio*
A′A′. Pappus not of fine hair-like bristles only, sometimes wanting.
C′. Involucral bracts in a single series, united essentially to apex into a tube or cup: lvs. pinnately divided, bearing internal glands containing a strong-scented oil.. 28. *Tagetes*
C′C′. Involucral bracts not in a single series, or if so, not united into a tube or cup: lvs. otherwise.
D′. Outer achenes strongly incurved, muricate, heteromorphous: receptacle naked; disk fls. sterile ..... 36. *Calendula*
D′D′. Outer achenes not incurved and muricate: receptacle (except in *Chrysanthemum*) chaffy or with chaff-like or bristle-like outgrowths from the margins of the areolae; disk fls. not sterile.
E′. Pappus of about 10 awned scales; achenes 5-ribbed ..... 27. *Gaillardia*
E′E′. Pappus not of awned scales; achenes not 5-ribbed.
F′. Outer involucral bracts few (about 5), wide-spreading, linear-spatulate, hispid-glandular; rays very short, the heads only about 1 cm. wide, or less: pappus none ..... 18. *Sigesbeckia*
F′F′. Outer involucral bracts not as above; rays mostly conspicuous, over 1 cm. long: pappus usually present.
G′. Involucre distinctly double; the outer of herbaceous but narrow bracts; the inner of flat membranous scales.
Achenes beaked ..... 26. *Cosmos*
Achenes not beaked although sometimes slender above.
Pappus of short teeth (not retrorsely barbed) or wanting.. 23. *Corcopsis*
Pappus of 2-4 retrorsely barbed stiff awns ..... 25. *Bidens*
G′G′. Involucre not double.
H′ Ray corollas sessile, indurated and persistent on the achenes.
Disk achenes compressed, very flat: lvs. entire: involucre strongly graduated ..... 16. *Zinnia*
Disk achenes strongly thickened: lvs. toothed: involucre slightly if at all graduated ..... 17. *Heliopsis*

H'H'. Ray corollas contracted at base into a short but distinct tube, not indurated nor persistent on the achenes.
I'. Phyllaries with scarious margins and tips ..... 30. *Chrysanthemum*
I'I'. Phyllaries herbaceous or foliaceous.
Achenes short and thick, without pappus: receptacle conic (often cultivated in a very double horticultural form with all the disk corollas changed into rays) ..... 20. *Rudbeckia*.
Achenes thickened but laterally compressed, with paleaceous pappus (this sometimes caducous): receptacle not conic.
Pappus caducous: lvs. usually opposite below, not lobed..... 22. *Helianthus*
Pappus persistent: lvs. alternate, often 3-lobed .. 21. *Tithonia*

A. **TUBULIFLORAE** Tubular-flowered Series 管花亜科 (Kuan Hua Ya K'o)

Plants without milky sap: *heads discoid* (without ray fls.) *or radiate* (with marginal ligulate, pistillate or neutral, ray fls.), *or with all fls. bilabiate* and perfect.

I. **Vernonieae** Vernonia Tribe 鹹蝦花族 (Hsien Hsia Hua Tsu)

Stout perennial herbs (ours), shrubs or trees: *heads discoid*: *fls.* all regular and tubular, *never yellow*; *pappus* (in ours) *of two series*; the outer very short and scale-like or bristle-like; the inner much longer, of slender bristles; style branches long and slender, finely hairy. 40 genera, mostly American.

1. **Vernonia** Schreb. 鹹蝦花属 (Hsien Hsia Hua Shu; Salted-shrimp Flower Genus)

Erect herbs (ours), shrubs (sometimes climbing), or trees with mostly alternate lanceolate entire or toothed lvs.: *heads small*, discoid, in loose terminal or axillary cymes or panicles; involucre mostly hemispheric: the overlapping bracts in several series: fls. all perfect; corolla regular, 5-cleft; anthers sagittate; style branches hairy: *pappus of 2 rows of hair-like bristles*, the outer series minute; achenes (in our species) unribbed; receptacle flat, naked. 500 species, in warm-temperate regions, especially in South America; 25 in China. (Named for William Vernon, English botanist.)

1. **Vernonia cinerea** (L.) Less. (M.F.466). Erect herb, to 1 m.; fls. blue to purple, X. Tropics of both hemispheres; locally in Ki. Woodland.

II. **Eupatorieae** Eupatorium Tribe 蘭草族 (Lan Ts'ao Tsu)

Herbs with mostly opposite lvs. and small *discoid heads*: *fls. never* pure *yellow*; *pappus of awned scales or long hairs*; style brs. club-shaped. 40 genera, mostly American.

2. **Ageratum** Linn. 勝紅薊属 (Shêng Hung Chi Shu)

Loose-growing annual (ours) or perennials, with mostly opposite petiolate lvs.: heads clustered, with narrow subequal involucral bracts in 2-3 series; receptacle (in ours) naked: fls. all tubular, blue (rarely pink) or white: fr. angled; *pappus of* 5 *awned scales*. 30 species, in tropical America; one cultivated and naturalized in China. (Greek: *Ager-atum*, not growing old; first used for some everlasting.)

1. **Ageratum conyzoides** Linn. 勝紅薊 (Shêng Hung Chi; Superior-red Thistle) (B.M. 1025). Loose-growing annual, to 8 dm.; fls. blue, pink, white, VII-IX. Most warm countries; locally in Ku. Cultivated, ornamental, naturalized. Fig. 368.

3. **Eupatorium** Linn. Boneset 蘭草属 (Lan Ts'ao Shu; Fragrant-herb Genus)

Erect mostly *perennial* herbs (ours), shrubs or trees with usually opposite lvs.: heads discoid, with many mostly white, lavender, or purple fls.; involucre in 2–many overlapping series: style brs. long-exserted, glabrous or nearly so: fr. 5–angled or ribbed; *pappus of* many *long* stiff *hairs* in one series. 600 species, chiefly American; 7 in China. (Dedicated to Mithridates Eupator, 132–63 B.C., who is said to have used a species of the genus in medicine.)

Key to the Species

Fls. whitish: bracts of the involucre obtuse: lvs. ovate-lanceolate, oblong or ovate, sometimes 3-parted ..... 1. *E. japonicum*
Fls. pinkish: bracts of the involucre acute: lvs. linear to lanceolate.. 2. *E. lindleyanum*

1. **Eupatorium japonicum** Thunb. 山蘭 (Shan Lan; Mountain Fragrance) (Mak.F.78). Erect herb, to 1.5 m.; fls. greenish white, VI–IX. Southeast Asia; locally in An., Ki., Ku. Brushland, grassland, woodland.

1a. **Eupatorium japonicum** Thunb. var. **tripartitum** Mak. (Kit.C.1:285). Lvs. tripartite; terminal segments larger than the lateral ones. Locally in An.

2. **Eupatorium lindleyanum** DC. 白鼓釘 (Pai Ku Ting; White-drum-nail) (Be.F.172). Erect herb, to 1 m.; fls. pinkish, VI–IX. Eastern Asia; locally in An., Ki., Ku. Meadows.

III. **Astereae** Aster Tribe 紫菀族 (Tzù Wan Tsu)

Erect herbs (ours) or shrubs with mostly alternate lvs.: heads radiate or discoid; receptacle usually naked: disk fls. generally yellow; anthers not tailed at the base; *style brs.* of disk fls. flattened, *with terminal appendages*; pappus various or none. 100 genera, of world-wide distribution, but most common in America.

4. **Solidago** Linn. Golden Rod 一枝黃花属 (I Chih Huang Hua Shu)

Erect perennial herbs, sometimes woody at the base, with alternate nearly sessile lvs.: *heads small*, oblong to campanulate, less than 1 cm. across, clustered: *bracts* of the involucre overlapping, *in several rows*, the outer shorter: *ray* and disk *fls. yellow*: fr. terete or angled, usually ribbed; pappus of slender bristles. 125 species, mostly of North America; one in China, with others cultivated or naturalized. (Greek: *solidare*, to make whole; from its reputed use in healing wounds.)

Key to the Species

Heads very small (disk 4 mm. or less high) and very numerous in a broad terminal panicle with spreading 1-sided racemiform brs..... 1. *S. canadensis*
Heads larger (disk mostly 6–9 mm. high), few to rather numerous, in axillary clusters and terminal, forming when well developed an oblong thyrsoid panicle..... 2. *S. virgaurea*

1. **Solidago canadensis** Linn. 美洲一枝黃花 (Mei Chou I Chih Huang Hua; American Solidago) (B.M.1005). Erect herb, to 2.5 m.; fls. yellow, VIII–X. Introduced from eastern North America; locally in Ku. Cultivated, ornamental, naturalized.

2. **Solidago virgaurea** Linn. 一枝黃花 (I Chih Huang Hua; A-cluster-of-yellow-flowers) (Be.F.179). Erect herb, to 8 dm.; fls. yellow, IX–X. Eurasia; locally in Ki., Ku. Grassland.

5. **Bellis** Linn. Daisy 延命菊属 (Yen Ming Chü Shu)

Low stemless herb with *basal lvs*: *heads solitary* on naked peduncles, radiate; receptacle conical, naked: *rays white or rose-colored*: disk fls. yellow: pappus none. 10 species, in Europe and the Mediterranean region; one cultivated in China. (Latin: *bellus*, pretty.)

1. **Bellis perennis** Linn. English Daisy 延命菊 (Yen Ming Chü; Long-life Chrysanthemum) (B.M.1004). Tufted perennial, to 1.5 dm.; fls. white or rose, II–IV; lvs. obovate. Introduced from western Europe; locally in Ku. Cultivated, ornamental. Fig. 369.

6. **Callistephus** Cass. 翠菊属 (Ts'ui Chü Shu)

Coarse herbs with alternate incised lvs. and *large* radiate *heads*, solitary at the ends of the brs.; *bracts* of the involucre in many series, *the outer herbaceous*, the inner membranous: *rays* of various colors, but *not yellow*: disk fls. yellow: fr. compressed; pappus of 2 rows of bristles, the outer series minute. One species, in eastern Asia. (Greek: *kallos*, beautiful; and *stephos* crown; referring to the fruit.)

1. **Callistephus chinensis** (L.) Ness China Aster 翠菊 (Ts'ui Chü; Brilliant Chrysanthemum) (B.M.1004). Erect annual, to 1 m.; fls. red, purple, white, IX–X; heads 5–8 cm. in diam. Eastern Asia; locally in An., Che., Ki., Ku. Cultivated, up ornamental.

7. **Aster** Linn. 紫菀属 (Tzŭ Wan Shu)

Erect *lfy.-stemmed* perennial herbs, rarely shrubby, with alternate lvs.: heads radiate, in panicles or corymbs, rarely solitary, with overlapping *involucral bracts in several series*; receptacle flat or convex, alveolate: *ray fls. in a single series*, white, blue, purple or pink: disk fls. yellow; *style brs. acute*: pappus of numerous slender bristles. 250 species, most abundant in North America; 60 in China. (Greek: *Aster*, a star; from the radiate heads.)

Key to the Species

a. Lvs. (at least the lower and middle) ovate, at base broadly rounded to cordate, conspicuously petioled, rough to the touch above .... 3. *A. scaber*

aa. Lvs. linear to lanceolate or oblong-ovate, tapering at base, sessile or short-petioled.

b. Lvs. sessile and clasping: stem densely hirsute and also glandular.. 2. *A. fordii*

bb. Lvs. sometimes sessile but not clasping: stem pubescence otherwise.

c. Pappus normal, about as long as disk corolla.

Heads numerous in dense corymbose clusters, small (the white rays about 3 mm. long); the pedicels mostly 5 mm. long or less: lvs. narrowly lanceolate or elliptic, entire; the middle ones about 5–10 mm. wide..... 1. *A. fastigiatus*

Heads in loose corymbose clusters, larger (the blue rays mostly 7–10 mm. long); the pedicels mostly 1–3 cm. long: lvs. lanceolate to oblong-ovate, usually toothed; the middle ones 1.5–5 cm. wide..... 6. *A. ageratoides*

cc. Pappus greatly reduced, much shorter than disk corolla, often of united scales.

Lvs. (at least the middle and upper) linear-lanceolate to narrowly lanceolate, entire, densely and finely gray-puberulent ..... 4. *A. pekinensis*

Middle lvs. mostly rhombic-lanceolate or wedge-obovate, usually sharply toothed, somewhat pubescent but green.. 5. *A. indicus*

1. **Aster fastigiatus** Fisch. 女菀 (Nü Wan) (Mak.F.71). Erect herb, to 1 m.; fls. white, IX–X. Northeastern Asia; locally in An., Ku. Roadsides, grassland.
2. **Aster fordii** Hemsl. (F.H.E.1:410). Erect herb, to 1 m.; fls. rose-purple, VIII–X. Southern and central China; locally in Ki., Ku. Grassland.
3. **Aster scaber** Thunb. 東風菜 (Tung Fêng Ts'ai; Eastern-wind Plant) (Mak.F.70). Erect herb, to 1 m.; fls. white, VII–X; petioles winged. Northeastern Asia; locally in An. Moist meadows.
4. **Aster pekinensis** (Hance) Merr. (*Aster holophyllus* Hemsl.; *Asteromoea pekinensis* Hance) 細葉紫菀 (Ssŭ Yeh Tzŭ Wan; Small-leaved *Aster tartaricus*) (ASNP IV. 15:225; Suny.3:262). Brg. herb, to 1 m.; fls. blue or lavender, VIII–X; stems not striate. Northeastern Asia; locally in An., Ku. Roadsides, grassland.
5. **Aster indicus** Linn. (*Asteromoea indica* Blume, *Boltonia indica* (L.) Benth., *Kalimeris indica* (L.) Schulz-Bip.) 鷄兒腸 (Chi Êrh Ch'ang; Chicken Intestine) (Mak. F.69). Brg. herb 3–8 dm. high; fls. blue, VII–X; stems striate. Southeastern Asia; locally in An., Ki., Ku. Grassland. Fig. 370.

Kalimeris shimadae Kitam. is separated (Kit.C.1:305) from *A. indicus* by having longer pappus setae, stouter stems and by being more hispid. Specimens are cited (J.J.B.19:340) from Kiangsu, Kiangsi and Hupeh.

6. **Aster ageratoides** Turcz. (H.F.3:252). Erect herb, to 1 m.; fls. blue, VIII–X; lvs. 3-nerved from base. Eastern Asia; locally in Che., Ki., Ku. Woodland, grassland.

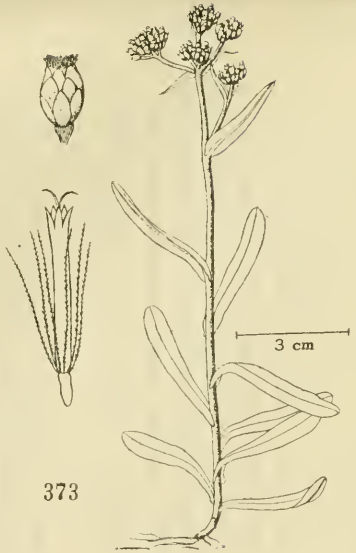
8. **Erigeron** Linn. Fleabane 野黃菊屬 (Yeh Huang Chü Shu)

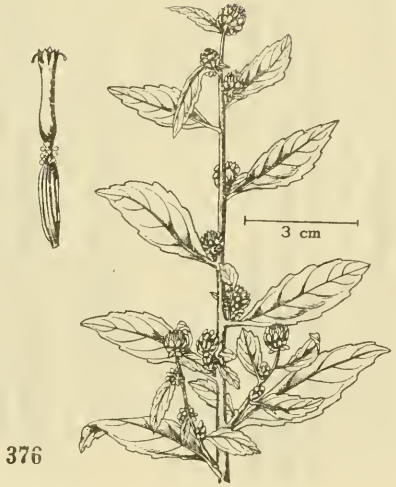
Branching or scapose herbs with alternate or basal lvs.: heads radiate, in corymbs or panicles, or solitary; *bracts of the involucre narrow, mostly in one series*: *rays* white, pink or purple, narrow, very many, pistillate, in 2–3 series: disk fls. yellow, tubular, perfect; corollas 5-lobed: pappus of bristles; fr. flattened, 2-nerved. 250 species, more abundant in the western hemisphere; 6 in China. Greek: *eri*, early and *geron*, old man; the ancient name of an early-flowering plant with hoary down.)

Key to the Species

Stem lvs. ovate to lanceolate; the lower coarsely serrate: rays evident.. 1. *E. annuus*
Stem lvs. mostly linear; the basal ones sometimes lobed or cleft: rays inconspicuous.
Heads about 5 mm. across..... 2. *E. canadensis*
Heads about 15 mm. across ..... 3. *E. linifolius*

1. **Erigeron annuus** (L.) Pers. Daisy Fleabane 一年蓬 (I Nien P'êng; Annual Erigeron) (G.M.1445). Erect annual, to 1.5 m.; fls. white, VI–X. Eastern North America, Eurasia; locally in Ki., Ku. Roadsides, field margins.
2. **Erigeron canadensis** Linn. Canada Fleabane 小蓬草 (Hsiao Chêng Ts'ao; Small-erect Herb) (G.M.1447). Erect annual, to 1.5 m.; fls. white, V–X. America, Eurasia; locally in An., Ki., Ku. Roadsides, field margins.
3. **Erigeron linifolius** Willd. 野地黃菊 (Yeh Ti Huang Chü; Wild-Rehmannia Chrysanthemum) (Be.F.176). Erect annual, to 1 m.; fls. gray-white, V–X. Eurasia, America; locally in An., Ku. Roadsides. Fig. 372.





373. Gnaphalium multiceps
374. Helichrysum bracteatum

375. Inula britannica
376. Carpesium abrotanoides

377. Xanthium strumarium
378. Zinnia elegans

IV. **Inuleae** Inula Tribe 旋覆花族 (Hsüan Fu Hua Tsu)

Brg. often low woolly herbs with mostly discoid or disciform heads, sometimes radiate; bracts of the involucre in several series: *anthers* sagittate, the basal lobes *tailed*: pappus usually of fine hairs or none, sometimes of scales. 150 genera, of world-wide distribution, but most common in the southern hemisphere.

9. **Anaphalis** DC. Everlasting 荻属 (Ti Shu)

Erect woolly perennial herbs with alternate entire lvs.: *internodes narrowly winged throughout*: heads disciform, small, in crowded corymbs; *bracts of the involucre scarious*, in several series, mostly *white*, the outer shorter: anthers tailed at the base; style 2-cleft: pappus of slender bristles. 35 species, in north temperate regions; 12 in China. (The Greek name of a similar plant.)

1. **Anaphalis sinica** Hance (J.B.1874:261). Erect perennial herb, to 0.8 m.; fls. white, VII–IX; some fls. sterile. Central China; locally in Ki. Grassland, brushland.

10. **Gnaphalium** Linn. Cudweed 鼠麴草属 (Shu Ch'ü Ts'ao Shu)

Woolly, often low diffuse herbs with alternate entire lvs. and small, often crowded, disciform heads: *internodes winged only above if at all*: *involucres yellow* or yellowish: all the fls. fertile, being either pistillate or perfect: pappus a single row of slender bristles. 120 species, widely distributed; 20 in China. (From the Greek term meaning "a lock of wool".)

Key to the Species

Lvs. linear, glabrous above: plant 5–10 dm. tall..... 1. *G. hypoleucum*
Lvs. linear-spatulate, white-woolly on both sides: plant 2–5 dm. tall.. 2. *G. multiceps*

1. **Gnaphalium hypoleucum** DC. 秋鼠麴草 (Ch'iu Shu Ch'ü Ts'ao) (Be.F.187). Erect herb, to 1 m.; fls. yellow, VIII–X. Southeastern Asia; locally in Ki., Ku. Roadsides, grassland.
2. **Gnaphalium multiceps** Wall. ex DC. 鼠麴草 (Shu Ch'ü Ts'ao; Rat-odor Herb) D.T.F.144). Slender herb, to 0.6 m.; fls. yellow, V–VII. Southeastern Asia; locally in An., Ki., Ku. Waste land. Fig. 373.

11. **Helichrysum** Gaertn. 蠟菊属 (La Chü Shu; Wax Chrysanthemum)

Herbs or shrubs, often woolly-tomentose, with alternate entire lvs.: *heads* disciform, 2–5 *cm. in diam.*, solitary or in terminal clusters; *involucral bracts* many, in several rows, *colored yellow, red or reddish purple*; the inner often enlarged and simulating rays: fls. of 2 kinds, the outer pistillate: pappus bristles sometimes feathery above. 300 species, in Eurasia, Africa and Australia; 1 cultivated in China. (Greek: *helio*, sun, and *chryso*, gold.)

1. **Helichrysum bracteatum** Andr. Strawflower (B.M.1022). Stout erect herb, to 1 m.; fls. yellow to reddish purple, VII; heads solitary. Introduced from Australia; locally in Ku. Cultivated, ornamental. Fig. 374.

12. **Inula** Linn. Elecampane 旋覆花属 (Hsüan Fu Hua Shu)

Coarse perennial herbs, with alternate lvs. and medium to large *radiate heads*;

bracts of the involucre overlapping, *in several series*, very unequal or subequal; the outer often herbaceous; receptacle naked: ray fls. pistillate: disk fls. perfect; anthers tailed at the base: fr. 4–5-ribbed; *pappus* a single row *of hair-like bristles*. 90 species, in Eurasia and Africa; 10 in China. (The old Latin name.)

1. **Inula britannica** Linn. 旋覆花 (Hsüan Fu Hua; Spiral-cap Flower) (DC.P.5:467). Erect herb, to 1 m.; fls. yellow, VII–X. Eurasia; locally in An., Ki., Ku. Roadsides, grassland. Fig. 375.

13. **Carpesium** Linn. 天名精屬 (T'ien Ming Ching Shu)

Erect brg. herbs with alternate lvs.: *heads disciform*; *bracts of the involucre herbaceous*, in several series, sometimes spreading: fls. yellow: receptacle flat, naked: anther bases sagittate, with slender tails: fr. elongated, striate, short-beaked; pappus none. 12 species, in Eurasia; 11 in China.

Key to the Species

Heads in lfy. racemes ..... 1. *C. abrotanoides*
Heads solitary, on long lfy. brs ..... 2. *C. atkinsonianum*

1. **Carpesium abrotanoides** Linn. (*C. cernuum* of Authors, not Linn.) 天名精 (T'ien Ming Ching; Essence-of-great-value) (H.F.3:301). Brg. herb, to 1 m.; fls. yellow, VIII–XI. Southeastern Asia; locally in An., Ki., Ku. Roadsides, grassland. Fig. 376.
2. **Carpesium atkinsonianum** Hemsl. (K.B.1893:157). Brg. herb, to 1 m.; fls. yellow, VII–IX. China; locally in An., Ki., Ku. Roadsides, grassland.

V. **Heliantheae** Helianthus Tribe 向日葵族 (Hsiang Jih K'uei Tsu)

Herbs (ours), shrubs or trees with opposite or alternate lvs. and mostly radiate heads; bracts of the *involucre not scarious*; *receptacle with chaffy scales* (except in *Sheareria*): style brs. with appendages at the tips: pappus never hair-like. 140 genera, most abundant in America.

14. **Sheareria** S. Moore 希萊菊屬 (Hsi Lai Chü Shu)

Slender brg. annual 1–3 dm. high: *lvs. few*, alternate, *linear or narrowly lanceolate*, 5–30 mm. long: *heads* small, *about 4 mm. long* and 3 mm. in diam., radiate, 4–6-fld.; involucre bell-shaped, with bracts in 2 series; the inner much larger: receptacle naked: rays white: anthers with triangular apical appendages; styles with 2 nearly equal linear brs.: *frs.* oblong, narrowly 3-*winged*, without pappus. Two species, in China. (Named for Dr. George Shearer, a British physician who collected many plant specimens near Kiukiang, Kiangsi, about 1873.)

1. **Sheareria nana** S. Moore 小希萊菊 (Hsiao Hsi Lai Chü) (J.B.1875:227). Slender herb, to 3 dm.; fls. white, VIII–IX. Central China; locally in Ki. Wet places.

15. **Xanthium** Linn. Cocklebur 蒼耳屬 (Hsi Êrh Shu)

Coarse brg. *monoecious* annuals with alternate lobed or dentate lvs. and rather small greenish *discoid heads*; the staminate in head-like terminal clusters; the pistillate below; staminate involucre of distinct bracts; *pistillate involucre a* hard ovoid *bur covered with hooked spines*, 2-celled, each cell producing a single oblong flattened

fr.; staminate receptacle chaffy; pappus none. 15 species, widely distributed; one in China. (Greek: *xantho (ium)*, yellow; since it yields a yellow hair dye.)

1. **Xanthium strumarium** Linn. 蒼耳 (Hsi Êrh; Ear Hemp) (G.M.1473). Coarse herb, to 8 dm.; fls. greenish, V–VI; fr. VIII–IX. All warm countries; locally in An., Che., Ki., Ku. Waste land, roadsides. Fig. 377.

16. **Zinnia** Linn. 百日草属 (Pai Jih Ts'ao Shu)

Herbs (ours) or sometimes shrubby, with *opposite* sessile *entire lvs.*: heads showy, solitary, terminal, 5–8 cm. in diam.; bracts of the *involucre in several overlapping series*; receptacle chaffy: *ray fls.* brightly colored, *persistent on the frs.* at maturity: frs. flattened; pappus, when present, of erect awns or scales. 12 species, in America; one cultivated in China. (After Johann Gottfried Zinn, 1727–1759, professor of medicine at Goettingen.)

1. **Zinnia elegans** Jacq. YOUTH-AND-OLD-AGE 百日草 (Pai Jih Ts'ao; Hundred-day Herb) (B.M.1001). Erect annual, to 8 dm.; fls. variously colored, V–X. Introduced from Mexico; locally in An., Ki., Ku. Cultivated-ornamental. Fig. 378.

17. **Heliopsis** Pers. 假菊諸属 (Chia Chü Shu Shu; False Helianthus tuberosus)

Stout erect perennial sunflower-like plants with opposite mostly petiolate lvs. and large showy fls.: *lf. blades toothed*, 3-nerved at the base: disk fls. partly enclosed in chaffy bracts of the receptacle: frs. without pappus, or obscurely toothed at the top; *disk achenes strongly thickened.* 7 species, in North America; one cultivated in China. (Greek meaning like the sun.)

1. **Heliopsis helianthoides** (L.) Sweet (B.M.1001). Erect perennial, 1–3 m.; fls. yellow, VII–IX. Eastern North America; locally in Ku. Cultivated, ornamental.

18. **Sigesbeckia** Linn. 豨莶属 (Hsi Lien Shu)

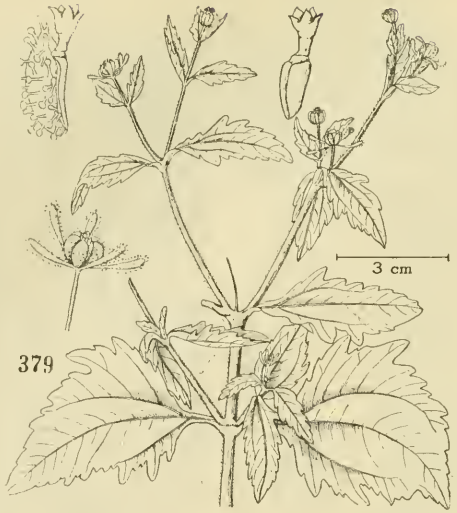
Erect herbs with opposite lvs.: heads in panicles, about 1.5 cm. in diam.; *bracts* of the involucre in 2 rows; *the outer linear-spatulate, spreading, glandular-hispid*: *rays very short*, yellow: *pappus none.* 4 species, in the warm parts of the Old World; one in China. (For Johann Georg Siegesbeck, Russian botanist, director of the medicinal garden in St. Petersburg–1736.)

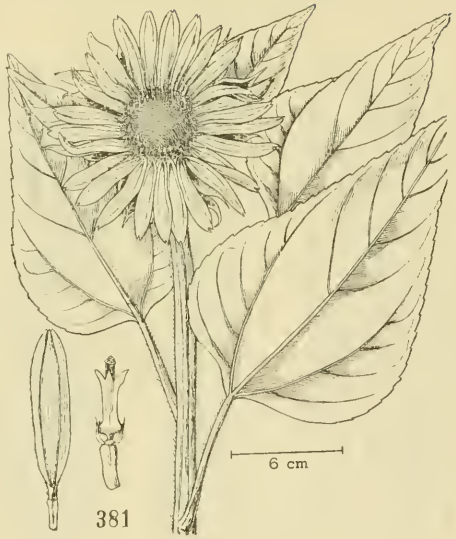
1. **Sigesbeckia orientalis** Linn. 豨莶 (Hsi Lien; Pig Vine) (Be.F.182). Erect herb, to 8 dm.; fls. yellowish green, VII–X. Warm countries of the eastern hemisphere; locally in An., Ku. Waste places. Fig. 379.

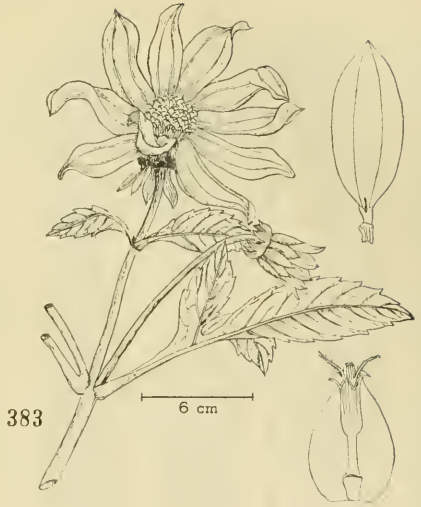
19. **Eclipta** Linn. 鯉腸属 (Li Ch'ang Shu)

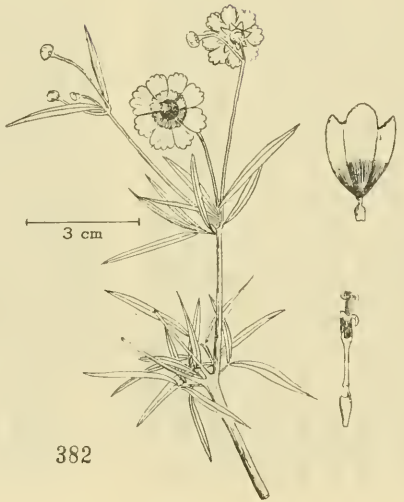
Rough slender erect or prostrate annuals with opposite, toothed or entire lvs.: *heads* small, *rarely over one cm. in diam.*, solitary, axillary or terminal; bracts of the involucre in 2 series, oblong or lanceolate, not glandular; receptacle chaffy: *rays numerous, narrow, white, in 2 rows*: fr. flattened; *pappus none.* 4 species, in tropical regions; one in China. (Greek: *ekleips*, to be deficient; referring to the pappus.)

1. **Eclipta alba** (L.) Hassk. 鯉腸 (Li Ch'iang; Carp Intestines) (M.F.476). Erect or









379. Sigesbeckia orientalis
380. Eclipta alba

381. Helianthus annuus
382. Coreopsis tinctoria

383. Dahlia pinnata
384. Bidens pilosa

prostrate annual, to 5 dm.; fls. white, VII–IX. Tropical and subtropical countries; locally in An., Ki., Ku. Margins of rice fields. Fig. 380.

20. **Rudbeckia** Linn. Coneflower 金光菊属 (Chin Kuan Chü Shu)

Coarse herb with alternate simple *deeply lobed or pinnatifid lvs.* and showy radiate heads, with conic receptacle; the peduncle not enlarged and hollow at the top; bracts of the involucre overlapping and in 2–4 series: rays yellow: *frs. short and thick*, 4-angled; *pappus* crown-like, cup-like or *none*. 30 species, in North America; one cultivated in China. (Named in honor of Professors Rudbeck: Olaf, 1630–1702, the father, and Olaf, 1660–1740, the son, who preceded Linnaeus at Uppsala.)

1. **Rudbeckia laciniata** Linn. var. **hortensis** Bailey Golden Glow 金光菊 (Chin Kuan Chü) (G.M.1481). Brg. perennial to 2 m.; fls. yellow, very double; all the disk corollas transformed to ligules, VIII. Cultigen; locally in Ki., Ku. Cultivated, ornamental.

21. **Tithonia** Desf. 王爺葵属 (Wang Yeh K'uei Shu)

Tall stout annual (ours) with *alternate* petioled entire or 3-*lobed lvs.* and large radiate heads on long peduncles which are swollen and hollow at the top: *frs.* oblong, thickened, somewhat hairy; *pappus* persistent, of 2 awns and several squamellae. 10 species; in tropical America; one cultivated in China. (From Tithonius, the favorite of Aurora, the Greek goddess of the morning.)

1. **Tithonia diversifolia** (Hemsl.) Gray 王爺葵 (Wang Yeh K'uei; Prince-of-sunflowers) (B.M.997). Stout herb to 3 m.; fls. deep orange, IX–X. Introduced from tropical America; locally in Ku. Cultivated, ornamental.

22. **Helianthus** Linn. Sunflower 向日葵属 (Hsiang Jih K'uei Shu)

Coarse erect tall herbs with ample lvs. usually opposite below and alternate above, in ours *not lobed or cleft*; *heads* large, *over 5 cm. in diam.*, radiate; bracts of the involucre overlapping, of several series: rays conspicuous, yellow: receptacle with chaffy scales: style brs. tipped by hairy appendages; frs. plump or somewhat 4-angled; *pappus* of thin chaffy scales, *early deciduous*. 70 species, in temperate and tropical America; 2 cultivated or naturalized in China. (Greek: *helios*, sun; and *anthos*, a flower.)

Key to the Species

Heads 8–15 cm. in diam.; disc brownish purple: plant annual ..... 1. *H. annuus*
Heads 5–8 cm. in diam.; disc yellow: plant perennial, with tubers..... 2. *H. tuberosus*

1. **Helianthus annuus** Linn. Common Sunflower 向日葵 (Hsiang Jih K'uei; Facing-the-sun Mallow) (B.M.998). Stout annual, to 4 m.; fls. yellow, VIII–X. Introduced from North America; locally in An., Che., Ki., Ku. Cultivated, fruit. Fig. 381.
2. **Helianthus tuberosus** Linn. Girasole 菊芋 (Chü Yü; Chrysanthemum Taro) (B.M.998). Brg. perennial, to 3 m.; fls. yellow, VII–X. Introduced from North America; locally in An., Che., Ki., Ku. Cultivated, tubers.

23. **Coreopsis** Linn. Tickseed 金鶏菊属 (Chin Chi Chü Shu)

Erect herbs (ours) or shrubs with mostly opposite lvs.: heads medium or large,

2–5 cm. in diam.; bracts of the involucre in 2 series, oblong to lanceolate, not glandular; receptacle chaffy: rays yellow, brown, or sometimes rose-colored: *fr.* flat or incurved, not beaked, sometimes winged; *pappus of* 2–4 *awns* (not retrorsely barbed), *scales or teeth, or none.* 70 species, in America, tropical Africa and Hawaii; 2 cultivated in China. (Greek: *koris*, bug, and *opsis*, resemblance; referring to the fruits.)

KEY TO THE SPECIES

Rays yellow, 2–3 cm. long: plant perennial ..... 1. *C. lanceolata*
Rays reddish brown, at least at the base, 1–1.5 cm. long: plant annual.. 2. *C. tinctoria*

1. **Coreopsis lanceolata** Linn. 大金鷄菊 (Ta Chin Chi Chü: Large-golden-chicken Chrysanthemum) (B.M.1003). Erect perennial herb, to 1 m.; fls. yellow, V–VIII. Introduced from eastern United States; locally in An., Ki., Ku. Cultivated, ornamental, naturalized.
2. **Coreopsis tinctoria** Nutt. 波斯菊 (Po Ssŭ Chü; Persian Chrysanthemum) (B.M.1003). Erect annual, to 1 m.; fls. yellow or brown, VI–VIII. Introduced from central United States; locally in Ku. Cultivated, ornamental. Fig. 382.

24. **Dahlia** Cav. 天竺牡丹属 (T'ien Chu Mu Tan Shu; Heavenly-bamboo Peony Genus)

Stout erect *tuberous-rooted* perennial herbs with *opposite* pinnate *lvs.*: *heads* large, 10–12 *cm. in diam.*; bracts or the involucre in 2 series; receptacle chaffy: rays white, red or purple: fr. oblong or obovate, flattened; *pappus of* 2 *small teeth, or none.* 15 species, in Central America; one cultivated in China. (Named after Andreas Dahl, a Swedish botanist, died 1789.)

1. **Dahlia pinnata** Cav. GARDEN DAHLIA 大理花 (Ta Li Hua) (B.M.1000). Erect perennial herbs, to 1.5 m.; fls. variously colored, X. Introduced from Central America; locally in Ku. Cultivated, ornamental. Fig. 383.

25. **Bidens** Linn. BUR MARIGOLD 鬼針草属 (Kuei Chên Ts'ao Shu)

Erect brg. herbs with opposite pinnately incised or divided lvs.: heads in panicles, with yellow or white rays; bracts of the involucre in 2 sets; the outer herbaceous; the inner membranous; chaff of the receptacle deciduous with the fr.: *fr.* flattened or 4-angled, not beaked, oblong or linear, crowned *with* 2–4 *barbed awns.* 90 species, mostly American; 6 in China. (Latin: *bi*, two; and *dens*, teeth; referring to the pappus awns.)

1. **Bidens pilosa** Linn. 鬼針草 (Kuei Chên Ts'ao; Devil's-needle Herb) (Be.F.183). Erect annual, to 0.8 m.; fls. yellow or nearly white, IX; fr. X. All warm countries; locally in Ki., Ku. Roadside, woodland. Fig. 384.

26. **Cosmos** Cav. 大波斯菊属 (Ta Po Ssŭ Chü Shu)

Tall branched herbs with mostly opposite lobed or *pinnatifid lvs.*: the large radiate heads solitary or in loose panicles; bracts of the involucre in 2 series; receptacle chaffy: *rays* showy, *variously colored*: *fr. beaked* at the top, and with 2–4 barbed or hispid deciduous awns. 20 species, in tropical America; 2 cultivated in China. (Greek: *kosmos*, ornament.)

Key to the Species

Rays white, pink or red: fr. glabrous; beak shorter than the body .... 1. *C. bipinnatus*
Rays yellow: fr. hispid; beak long and slender..... 2. *C. sulphureus*

1. **Cosmos bipinnatus** Cav. 大波斯菊 (Ta Po Ssŭ Chü; Large-Persian Chrysanthemum) (B.M.999). Erect annual, to 3 m.; fls. white, pink, red, X. Introduced from Mexico; locally in An., Ku. Cultivated, ornamental.
2. **Cosmos sulphureus** Cav. Yellow Cosmos (B.M.999). Erect annual, to 2 m.; fls. yellow, X. Introduced from Mexico; locally in An., Ku. Cultivated, ornamental.

VI. **Helenieae** Helenium Tribe 何嫩菊族 (Ho Nun Chü Tsu)

Herbs (ours), rarely woody, with alternate or opposite pinnately divided or simple lvs. and mostly yellow fls.: heads radiate or discoid: bracts of the involucre scarcely if at all overlapping, sometimes scarious: *receptacle not chaffy*; *pappus of chaffy or bristly-dissected scales*: 50 genera, mostly American.

27. **Gaillardia** Foug. 天人菊屬 (T'ien Jên Chü Shu)

Erect herbs with alternate, entire or toothed punctate lvs. and large long-peduncled radiate or discoid heads; *bracts of the involucre distinct, in 2–3 series*; receptacle convex or globose, bristly or nearly naked: rays yellow or yellow and red: style brs. with appendages: *frs. 5-ribbed*, densely hairy, at least at the base; *pappus of* 5–10 *awned scales*. 15 species, American; one cultivated in China. (Named for M. Gaillard de Marentonneau, a patron of Botany in France.)

1. **Gaillardia aristata** Pursh 天人菊 (T'ien Jên Chü; Angel's Chrysanthemum) (B.M.1014). Erect perennial herb, to 1 m.; fls. yellow and red, IX–X. Introduced from North America; locally in Ku. Cultivated, ornamental. Fig. 385.

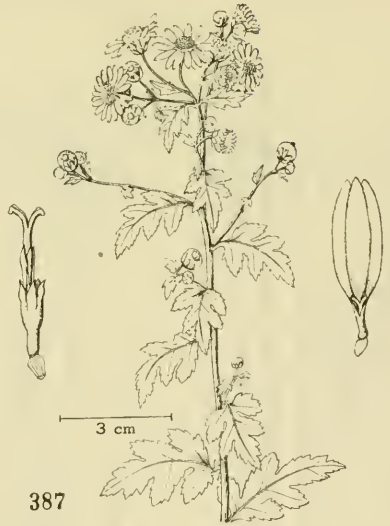
28. **Tagetes** Linn. 万寿菊屬 (Wan Shou Chü Shu)

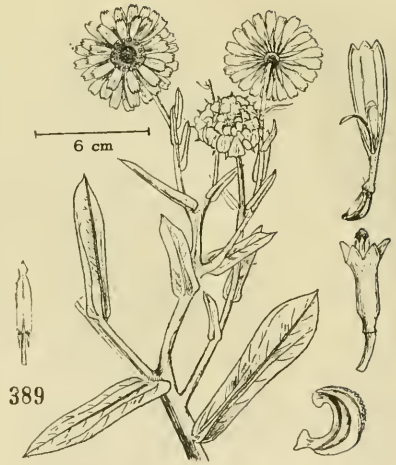
Erect brg. ill-smelling glabrous herbs with opposite *pinnately divided* gland-dotted *lvs.* and long-peduncled solitary or clustered radiate yellow heads; *involucre* cylindric, the *bracts in a single series, united into a tube* or cup: fr. compressed or angled; pappus scales few, slender. 20 species, of tropical America; two or more cultivated in China. (Said to be from "Tages", an Etruscan god.)

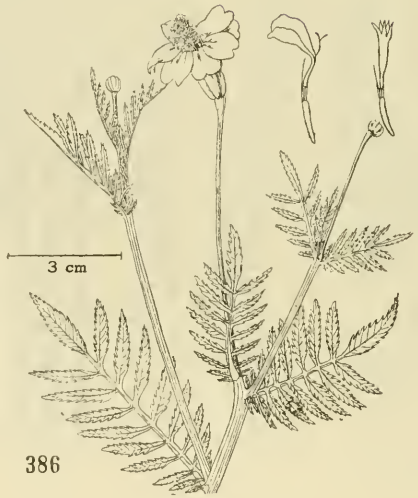
Key to the Species

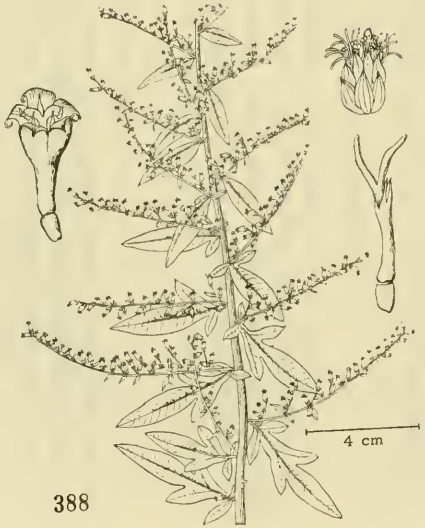
Rays numerous, more than 5: heads 3–10 cm. in diam.
Fls. not marked with red: heads 5–10 cm. in diam. ..... 1. *T. erecta*
Fls. usually marked with red: heads 3–4 cm. in diam..... 2. *T. patula*
Rays few, about 5: heads 2–3 cm. in diam. ..... 3. *T. tenuifolia*

1. **Tagetes erecta** Linn. African Marigold 万寿菊 (Wan Shou; Chü) Long-life Chrysanthemum) (B.M.1013). Erect annual, to 1 m.; fls. yellow, VIII–X. Introduced from Mexico; locally in Ku. Cultivated, ornamental. Fig. 386.
2. **Tagetes patula** Linn. French Marigold (B.M.1013). Bushy annual, 2–5 dm. high; fls. yellow and red. Introduced from Mexico; locally in Ku. Cultivated, ornamental.
3. **Tagetes tenuifolia** Cav. (*T. signata* Bartl.) 西番菊 (Hsi Fan Chü) (B.M.1013). Brg. annual, to 8 dm.; fls. yellow. Introduced from Mexico; locally in Ku. Cultivated, ornamental.









385. Gaillardia aristata
386. Tagetes erecta

387. Chrysanthemum indicum
388. Artemisia vulgaris

389. Calendula officinalis
390. Cirsium segetum

VII. **Anthemideae** Anthemis Tribe 羅馬加密列族 (Lo Ma Chia Mi Lieh Tsu)

Shrubs or herbs with mostly alternate often pinnate lvs. and radiate or discoid heads; bracts of the involucre mostly *scarious* and overlapping; receptacle chaffy or not: style brs. usually truncate: *pappus* a short crown or *none*. 50 genera, widely distributed.

29. **Achillea** Linn. Yarrow 著属 (Shih Shu)

Herbs, mostly perennial, with erect lfy. stems: *lvs. alternate* (or basal), *finely pinnatisect*: *heads small*, ovoid or campanulate, numerous, *radiate, in crowded terminal corymbs*; involucres ovoid or campanulate; bracts with scarious margins, imbricated in several series; the outer shorter; *receptacle chaffy*: achenes flattened; pappus none. 75 species, in the northern hemisphere; 3 or more in China. (Named for Achilles, who was said to have discovered its healing powers.)

1. **Achillea millefolium** Linn. (B.M.1515). Erect herb, 4–8 dm. high; fls. white, VI. Eurasia; locally in Che., Ku. Naturalized weed.

30. **Chrysanthemum** Linn. 菊属 (Chü Shu)

Erect annual or perennial herbs with alternate dentate, incised or dissected lvs. and *large* peduncled *radiate heads*; involucres hemispherical; *bracts with scarious margin*, in several series; receptacle naked: rays white, yellow or various shades of red and purple: pappus none or a scaly cup. 150 species, in the northern hemisphere; 10 in China. (Greek: *chrysos*, gold, and *anthemom*, flower.)

Key to the Species

a. A wild plant or weed: rays yellow: heads 1.5–2.5 cm. in diam... 1. *C. indicum*
aa. Cultivated plants: heads 3 cm. or more in diam.
  b. Rays usually not conspicuously doubled: heads 3–4 cm. in diam.
    c. Rays not yellow.
      d. Lvs. coarsely toothed, spatulate: rays white..... 2. *C. maximum*
      dd. Lvs. pinnatifid.
        e. Foliage grayish, densely appressed-pubescent: rays white and showy ..... 3. *C. cinerariaefolium*
        ee. Foliage green, essentially glabrous: rays white, pink, lilac, crimson or dark red ..... 4. *C. coccineum*
    cc. Rays yellow or yellowish white: cultivated as annuals for ornament ..... 5. *C. coronarium* var. *spatiosum*
  bb. Rays conspicuously doubled: the autumn chrysanthemum of florists and gardeners: heads 6–10 cm. in diam. ..... 6. *C. morifolium*

1. **Chrysanthemum indicum** Linn. 野菊 (Yeh Chü; Wild Chrysanthemum) (M.F.474). Ascending perennial herb, to 1 m.; fls. yellow, VII–XI. China, Japan; locally in An., Ki., Ku. Roadsides, grassland. Fig. 387.

1a. **Chrysanthemum indicum** Linn. var. **lushanense** (Kitam.) Hand.-Mazz. (*C. lushanense* Kitam.) (J.J.B.13:163). Lvs. and involucre white-lanate. Locally in Ki., Ku.

1b. **Chrysanthemum indicum** Linn. var. **procumbens** (Lour.) Nakai (*C. procumbens* Lour.)* (J.J.B.19:344). Brs. purple, procumbent, flexible. Locally in Che., Hon., Ku.

*This plant appears to be scarcely more than a procumbent form of *C. indica*.

Handel-Mazzetti has described *C. nankingense* (A.H.G.12:258) as a distinct species standing between *C. indicum* and *C. lavendulaefolium* (Fisch.) Mak., but has not specifically stated the differences. Kitamura has reduced *C. nankingense* to *C. indicum* var. *edule* (J.J.B.19:343). The present writer, not having seen the specimens cited, is uncertain as to the validity of this species or variety.

2. **Chrysanthemum maximum** Ram. Shasta Daisy (B.M.988). Perennial herb, to 8 dm.; fls. white, V. Introduced from the Pyrenees; locally in Ku. Cultivated, ornamental.
3. **Chrysanthemum cinerariaefolium** (Trevir.) Vis. Dalmatian Pyrethrum 白花除蟲菊 (Pai Hua Ch'u Ch'ung Chü; White-flowered Insecticide Chrysanthemum) (B.M.988). Slender brg. perennial herb, to 8 dm.; fls. white, V–VI. Introduced from Jugoslavia; locally in Che., Ku. Cultivated, insecticide.
4. **Chrysanthemum coccineum** Willd. Common Pyrethrum 赤花除蟲菊 (Ch'ih Hua Ch'u Ch'ung Chü; Red-flowered Insecticide-Chrysanthemum) (B.M.987). Perennial herb, to 8 dm.; fls. white, pink, red, lilac. Introduced from southwestern Asia; locally in Ku. Cultivated, ornamental.
5. **Chrysanthemum coronarium** Linn. var. **spatiosum** Bailey Garland Chrysanthemum 茼蒿 (T'ung Hao) (B.M.987). Perennial herb, to 1 m.; fls. yellow, yellowish white, V–VI; lvs. simply pinnatifid. Introduced from the Mediterranean region; locally in An., Ku. Cultivated, leaf-vegetable.
6. **Chrysanthemum morifolium** Ram. Florist's Chrysanthemum (B.M.989). Erect perennial herb, to 1 m.; fls. variously colored, X–XI. Cultigen from eastern Asia; locally in An., Che., Ki., Ku. Cultivated, ornamental, tea, flowers.

31. **Artemisia** Linn. Wormwood 艾属 (Ai Shu)

Strongly scented herbs or shrubs with alternate often pinnately dissected glabrous or tomentose lvs.; *heads discoid or disciform, small, numerous*, variously clustered, often drooping: marginal fls. in some species pistillate and fertile; central fls. perfect, sometimes sterile: bracts of the involucre, or some of them, scarious: receptacle naked or pubescent: *achenes short, not beaked*; pappus none. 225 species, in the northern hemisphere and South America; 25 in China. (Named for Artemisia, wife of Mausolus, King of Caria, an ancient division of southwestern Asia Minor, who erected a stately monument in honor of her husband.)

Key to the Species

a. Plant (annual), with a tap root which is not much branched..... 1. *A. annua*
aa. Plant (perennial), often more or less woody at the base, with well developed secondary roots.
b. Stems unbranched: lvs. simple, ovate-lanceolate, acute or acuminate, 5–10 cm. long, with serrate margins ..... 2. *A. anomala*
bb. Stems branched: lvs. pinnately cleft or divided.
c. Lvs. divided into linear or filiform segments.
Frs. several within each involucre..... 3. *A. capillaris*
Frs. solitary within each involucre ..... 4. *A. scoparia*
cc. Lvs. cleft or divided into cuneate or oblong segments.
d. Outer bracts of the involucre herbaceous: lvs. pectinately twice pinnatifid..... 5. *A. sacrorum*
dd. Bracts of the involucre scarious, or with scarious margins:

lvs. pinnately cleft or divided; the rhachis of the lfts. not pectinate.
e. Lvs. gray-tomentose below, glabrous or hairy above.... 6. *A. vulgaris*
ee. Lvs. glabrous or sparsely pubescent.
Heads very many, in terminal panicles, ovoid, 1–2 mm. in diam.: lf. segments definitely cuneate and generally trifid ..... 7. *A. japonica*
Heads not so abundant, in axillary racemes.
Heads hemispherical, about 5 mm. in diam.: lvs. tripinnatisect; lobes cuneate-oblong, 3–5 mm. long..... 8. *A. apiacea*
Heads ovoid to campanulate, 2–3 mm. in diam.: lvs. pinnately lobed or cleft; segments narrowly ovate, 20–60 mm. long; margins doubly serrate.. 9. *A. lactiflora*

1. **Artemisia annua** Linn. 黃花蒿 (Huang Hua Hao; Yellow-flowered Wormwood) (G. M. 1522). Brg. annual, to 2 m.; fls. greenish, IX–XI. Eurasia; locally in An., Che. .Hup., Ki., Ku. Roadsides, gassland.
2. **Artemisia anomala** S. Moore (D.T.F. 147). Erect perennial, to 2 m., fls. whitish, VI-VII; fr. IX–X. Southern and central China; locally in An., Che., Ki., Ku. Grassland.
3. **Artemisia capillaris** Thunb. 茵陳蒿 (Yin Ch'ên Hao; Old-mat Wormwood) (Som. D .4: 952). Erect perennial, to 1 m.; fls. greenish, IX. Eastern Asia; locally in Ku. Grassland.
4. **Artemisia scoparia** Waldst. & Kit. 刷帚艾 (Shua Chou Ai; Scouringbrush Wormwood) (H.F. 3: 323). Brg. perennial herb, to 8 dm.; fls. greenish, VIII–IX. Eurasia; locally in Ku. Grassland.
5. **Artemisia sacrorum** Leded. 白蓮蒿 (Pai Lien Hao) (H.F. 3: 326). Brg. perennial, to 1 m.; fls. gray-green, IX–X. Eastern Asia; locally in An., Hup., Ku. Roadsides, grassland.
6. **Artemisia vulgaris** Linn. Common Mugwort 艾蒿 (Ai Hao; Common Wormwood) (G.M. 1522). Erect herb, to 1 m.; fls. gray-white, VIII–X. Eurasia; locally in An., Ki, Ku. Roadsides, grassland, brushland. Fig. 388.

Kitamura (J.J.B.20:192–4) has recorded *A. gilvescens* Miq. (AMBL-B 2:175) and has described *A. migoana* Kitam. as belonging to this area. They are by designation or by description related to *A. vulgaris*, and are regarded by the present writer as doubtfully distinct from that species.

7. **Artemisia japonica** Thunb. 牡蒿 (Mu Hao; Male Wormwood) (Be.F. 186). Erect perennial, to 1 m.; fls. greenish, VII–VIII. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Grassland.
8. **Artemisia apiacea** Hance (Wa. A. 2: 895). Erect perennial, to 1 m.; fls. VIII–IX. Southeastern China; locally in Che., Ku. Grassland.
9. **Artemisia lactiflora** Wall. ex DC. 四季菜 (Ssŭ Chi Ts'ai; Four-seasons Plant) (D.T. F. 148). Erect perennial, to 1 m.; fls. whitish, IX–X. Southern and central China; locally in Hup., Ki. Brushland.

VIII. **Senecioneae** Senecio Tribe 望江南族 (Wang Chiang Nan Tsu)

Herbs (ours), shrubs or rarely trees, with alternate lvs. and radiate or discoid heads; *bracts of the involucre* not scarious, essentially in a single series, *little or not at all overlapping*, sometimes with a few small outer bractlets; receptacle naked: *pappus*

of hairs. 50 genera, in all parts of the world.

32. **Gynura** Cass. 三七草属 (San Ch'i Ts'ao Shu)

Herbs or shrubs with alternate entire or *pinnately lobed lvs.* and *discoid heads* in terminal corymbs; involucre cylindric or bell-shaped; the *numerous bracts in a single series, withsome smaller ones around the base*: receptacle not chaffy: style brs. sometimes ending in hairy points: frs. 5–10-striate; pappus of many slender white hair-like bristles. 25 species, in the warm parts of Asia and Africa; 7 in China. (From two Greek words, referring to the tailed stigmas of some species.)

1. **Gynura pinnatifida** (Lour.) DC. 三七草 (San Ch'i Ts'ao) (DC.P. 6: 301). Erect herb, to 1 m.; fls. yellow, VI–VII. Eastern Asia; locally in Ku. Waste ground.

33. **Cacalia** Linn. Indian Plantain 兎兜傘属 (T'u Êrh San Shu; Rabbit-umbrella Genus)

Tall perennial mostly glabrous herbs, rarely woody, with alternate petiolate *lvs.*; ours *palmately lobed or cleft*: the white, yellow or pinkish *discoid heads* in terminal corymbs: bracts of the involucre about 5, essentially in one row (very short outer bractlets sometimes present): receptacle not chaffy: pappus of numerous white hair-like bristles. 40 species, in North and Central America and northeastern Asia; two or more in China.

Key to the Species

Lvs. orbicular, palmately divided.	
Heads of the infl. arranged in corymbs	1. *C. aconitifolia*
Heads of the infl. arranged in panicles	2. *C. kraemeri*
Lvs. triangular, lobed but not divided	3. *C. rubescens*

1. **Cacalia aconitifolia** Bunge 烏頭葉黃花杖 (Wu T'ou Yeh Huang Hua Chih; Dark-leaved *Senecio scandens*) (DC.P. 6: 329). Erect herb, to 1.3 m.; fls. white, pink, purplish, VI–VIII. Northeastern Asia; locally in An., Che., Hun., Hup., Ku. Grassland, shrubland.
2. **Cacalia kraemeri** (Fr. & Sav.) Matsum. (*Senecio kraemeri* Franch. & Savat.) (Fra. & Sav. 2: 406). Erect herb, to 1.2 m.; fls. VI. Northeastern Asia; locally in An.

Maximowicz (Max.F.165,t.8) has described the genus *Syneilesis*, with *Cacalia aconitifolia* as the type species, and separated from *Cacalia* chiefly by its single convolute cotyledon. Kitamura (Kit.C.3:170) has retained *Syneilesis* and states, following his study of four species, that "The cotyledons are always single and folded longitudinally. The base of the petioles of the inferior cauline leaves always completely enclose the stem. These characters are not observed in the typical *cacalia*".

3. **Cacalia rubescens** (S. Moore) Bailey (*Senecio rubescens* S. Moore) (B.G. 1: 47). Erect herb, to 1.5 m.; fls. white, purplish, VII–IX. Eastern Asia; locally in An., Ki. Brushland, woodland.

Kitamura (J.J.B.20:196) has named *C. matsudae* as a species related to *C. rubescens*, but having all parts larger, and with more numerous flowers in each head. The specimens cited are from western Chekiang.

34. **Senecio** Linn. Ragwort 蒿江南属 (Wang Chiang Nan Shu)

Herbs (ours), shrubs or trees with alternate or basal lvs. and solitary or clustered many-fld. usually *radiate heads*, 0.5–1.5 *cm. high*: principal bracts of the involucre in one series; receptacle flat, naked, often honeycombed: fr. 5–10-ribbed; pappus of numerous white hair-like bristles. 1,200 species, in all parts of the world; 150 in China; one of the largest of plant genera. (Latin: *senex*, old man; referring to the abundant white pappus of some species.)

Key to the Species

Plant erect.
Plant stout: heads clustered, about 2 cm. across: lvs. lanceolate or spathulate, mostly entire ..... 1. *S. campestris*
Plant slender: heads scattered, about 1 cm. across: lvs. ovate, serrate.. 2. *S. oldhamianus*
Plant vine-like ..... 3. *S. scandens*

1. **Senecio campestris** DC. 狗舌草 (Kou Shê Ts'ao; Dog's-tongue Herb) (Mak.F. 29). Stout herb, to 8 dm.; fls. yellow, III–V. Eurasia; locally in An., Ki., Ku. Sandy grassland.
2. **Senecio oldhamianus** Maxim. (St.P.B. 16: 219). Slender herb, to 5 dm.; fls. yellow, V–VI. China; locally in An., Che., Ki., Ku. Moist cliffs.
3. **Senecio scandens** Buch.-Ham. 黃花枝草 (Huang Hua Chih Ts'ao; Yellow-flower-branch Herb) (B.M. 1019). Scandent perennial herb; fls. yellow, X; lvs. finely pubescent. Southeastern Asia; locally in An., Ki., Ku. Woodland.

35. **Ligularia** Cass. 橐吾属 (T'o Wu Shu)

Perennial herbs with alternate lvs. which have *petioles clasping the stem*: *heads radiate*, large; *disk* 1.2–2.5 *cm. high*: rays yellow: involucre tubular or campanulate, of a single series of imbricated bracts: style brs. obtuse or round, not truncate: achenes glabrous; pappus of long or short bristles, scabrous or barbellate. Nearly 100 species, mostly in Asia; 25 or more in China. (Name refers to the strap-shaped or more or less bilabiate flowers.)

Key to the Species

Lvs. palmatipartite ..... 1. *L. japonica*
Lvs. dentate, but not deeply lobed or parted.
Flg. involucres few, 12–20 mm. in diam., each with several linear-lanceolate basal bracts ..... 2. *L. kaempferi*
Flg. involucres many (about 30), not over 10 mm. in diam., each with 2 or 3 linear basal bracts ..... 3. *L. sibirica*

1. **Ligularia japonica** (Thunb.) Less. (*Senecio japonica* (Thunb.) Schultz-Bip.) 望江南 (Wang Chiang Nan; Looking-forward-to-the-south-of-the-river) (Mak.F. 26). Stout herb, to 1.5 m.; fls. orange-yellow, VII. Southeastern Asia; locally in An., Che., Ki. Moist woodland.
2. **Ligularia kaempferi** Sieb. & Zucc. (*Senecio kaempferi* (S. & Z.) DC.) (B.M. 1018). Erect herb, to 8 dm.; fls. lemon-yellow, VIII–X. Southeastern Asia; locally in An., Che., Ku. Grassland.
3. **Ligularia sibirica** Cass. (*Senecio ligularia* Hook. f.) (Mak. F. 25; F.H.E. 1: 454). Erect herb, to 1.5 m.; fls. orange, yellow, VII–VIII. Asia; locally in An., Ki. Moist woodland.

Kitamura (J.J.B.21:53) has described "Ligularia chekiangensis" with discoid heads, while his keys and description for the genus *Ligularia* (Kit.C.3:160,184) characterize it with radiate heads. The specimen cited is from Hsitienmushan, Chekiang.

IX. **Calenduleae** Calendula Tribe 金盞草族 (Chin Chan Ts'ao Tsu)

Herbs with mostly alternate lvs. and *radiate heads*: bracts of the involucre in 1–2 series, subequal: receptacle naked: *anthers at base* mucronate or caudate: outer achenes (in ours) strongly incurved, muricate, heteromorphous: pappus in ours none. 8 genera, in South Africa, the Mediterranean region, Persia and Tierra del Fuego.

36. **Calendula** Linn. 金盞草 (Chin Chan Ts'ao Shu)

Herbs with alternate simple lvs. and large yellow or orange radiate heads; bracts of the involucre scarious-margined; receptacle flat, naked: *only the ray fls. fertile*: *fr.* glabrous, *incurved*; pappus none. 15 species, Canary Islands to Persia; one cultivated in China. (Latin: *calendae*, throughout the months.)

1. **Calendula officinalis** Linn. Pot Marigold 金盞花 (Chin Chan Hua; Golden-bowl Flower) (B.M. 1016). Annual, to 8 dm.; fls. yellow, IV–V. Southern Europe; locally in An., Ku. Cultivated, ornamental. Fig. 389.

X. **Cynareae** Cynara Tribe 朝鮮薊族 (Chao Hsien Chi Tsu; Korean-thistle Tribe)

Herbs, rarely shrubs, with alternate often spiny-toothed or lobed lvs. and *discoid heads*, the outer corollas sometimes enlarged and falsely radiate: receptacle bristly; bracts of the involucre overlapping, often spiny or scarious: *anthers tailed at the base and with long stiff appendages at the tips*: pappus of bristles or scales. 35 genera, most abundant in Eurasia, especially in the Mediterranean region.

37. **Echinops** Linn. Globe Thistle 单州漏盧屬 (Tan Chou Lou Lu Shu)

Coarse thistle-like herbs with alternate *spiny* pinnatifid or dentate lvs.; the stems and lower surfaces of the lvs. more or less white-woolly: *involucres* 1-*fld.*, *in dense globose compound heads*: fr. usually villous; *pappus of many short scales*. 60 species, in Eurasia and northern Africa; 2 or more in China. (Greek: *echinos*, hedgehog, like-a-hedgehog. from the spiny involucral bracts.)

1. **Echinops dahuricus** Fisch. (*E. grijsii* Hance) 单州漏盧 (Tan Chou Lou Lu) DC.P.6:523:F.H.E.1:459). Erect perennial herb, to 1 m.; fls. blue, VIII–IX. Eastern Asia; locally in Ku. Grassland.

38. **Atractylis** Linn. 蒼朮屬 (Ts'ang Shu Shu)

Herbs, woody at the base, with *spiny* dentate or pinnatifid lvs. and terminal heads; *outer bracts* of the involucre *pinnately dissected* into spine-tipped linear segments; inner bracts overlapping and entire: heads without rays: fr. very hairy; *pappus plumose*. 15 species, in Eurasia; one in China.

1. **Atractylis ovata** Thunb. (*A. chinensis* DC.) 蒼朮 (Ts'ang Shu; Gray Plant) (DC.P.6:549;F.H.E.1:459). Brg. perennial, to 1 m.; fls. white, VIII. Eastern Asia; locally in Che., Ki., Ku. Grassland, cultivated, insecticide.

39. **Arctium** Linn. Burdock 牛蒡屬 (Niu P'ang Shu)

Coarse, brg., rank-smelling, rough, mostly biennial herbs, with large alternate lvs. and rather large globose or urn-shaped bur-like heads of purple or white fls.; *bracts* of the involucre rigid, *with hooked tips*: filaments glabrous: *pappus* of numerous short serrulate deciduous *scales*. 6 species, in Eurasia; one in China. (Greek: *Arction*, from *arctos*, a bear, from the rough involucre.)

1. **Arctium lappa** Linn. Great Burdock 牛蒡 (Niu P'ang) (G.M.1537). Brg. perennial herb, to 3 m.; fls. pink, purple, VII–VIII. Eurasia; locally in Che., Ku. Roadsides, waste places.

40. **Saussurea** DC. 野苦麻屬 (Yeh K'u Ma Shu; Wild-bitter-hemp Genus)

Herbs of various habit with alternate lvs. and discoid heads of purple or bluish fls.; bracts of the involucre in several rows, not spiny: filaments glabrous; style brs. linear: *fr. not oblique at the base*; *pappus hairs in* 1 *or* 2 *rows, the inner* feathery and *united into a ring at the base*. 125 species, in north temperate regions; 100 in China.

Key to the Species

Lvs. pinnately cleft, white-tomentose beneath: bracts of the involucre without appendages ..... 1. *S. carthamoides*
Lvs. entire, not tomentose: bracts of the involucre with rose-colored appendages at the tips ..... 2. *S. glomerata*

1. **Saussurea carthamoides** (Buch.-Ham.) Benth. (*S. affinis* Spreng.) 泥胡菜 (Ni Hu Ts'ai; Mongolian-clay Vegetable) (Be.F.168; F.H.E.1:463). Erect annual, to 1 m.; fls. purple, V–VI. Eastern Asia; locally in An., Ki., Ku. Woodland, waste places.
2. **Saussurea glomerata** Poir. var. **chinensis** Chen 棍棒狀泥胡菜 (Kun Pang Chuang Ni Hu Ts'ai; Rod-shaped *S. affinis*) (Fa.B.5:83). Erect herb, to 1.5 m.; fls. pink, IX–X. China; locally in An., Ki., Ku. Brushland.

41. **Carduus** Linn. Plumeless Thistle 飛廉屬 (Fei Lien Shu; Winged-modesty Genus)

Stout annual, biennial or perennial herbs with sessile *spiny-toothed or -lobed lvs.* and large or medium-sized discoid heads; outer and middle bracts of the involucre spine-tipped; the inner not spiny and often colored: fr. glabrous; *pappus bristles simple*. 80 species, in Eurasia; one in China. (The old Latin name.)

1. **Carduus crispus** Linn. Welted Thistle 飛廉 (Fei Lien) (G.M.1538). Erect biennial, to 1.3 m.; fls. pink, purple, V–VIII. Eurasia; locally in An., Ku. Roadside, waste land.

42. **Cirsium** Hill Plumed Thistle 薊屬 (Chi Shu)

Biennial or perennial prickly or *spiny* herbs with alternate or basal dentate, lobed or pinnatifid *lvs.* and large discoid heads; bracts of the involucre overlapping, in many series; receptacle bristly: frs. glabrous; *pappus of plumose bristles*. 200 species, in the northern hemisphere; 20 in China. (Greek: *Cirsion*, from *cirsos*, a swollen vein.)

Key to the Species

Heads 4–5 cm. across ..... 1. *C. japonicum*

Heads 2–3 cm. across.
Lvs. mostly linear, white-tomentose beneath..... 2. *C. chinense*
Lvs. oblong, spiny-serrulate or notched, not tomentose..... 3. *C. segetum*

1. **Cirsium japonicum** DC. 小薊 (Hsiao Chi; Small Thistle) (Mak.F.20). Stout herb, to 1 m.; fls. pink, purple, V–IX. Eastern Asia; locally in An., Ki., Ku. Waste land.
2. **Cirsium chinense** Gard. & Champ. 苦芙 (Ku Yao) (Be.F.168). Erect herb, to 2 m.; fls. purple, VIII–IX. Southeastern Asia; locally in An., Ki., Ku. Grassland.
3. **Cirsium segetum** Bunge (*Cephalonoplos segetum* (Bge.) Kitam.) (Kit.C.1:1137). Erect perennial herb, to 7 dm.; fls. pink, purple, IV–VI. Eastern Asia; locally in An., Ki., Ku. Roadsides, waste land. Fig. 390.

43. **Serratula** Linn. 田村草属 (T'ien Ts'un Ts'ao Shu; Village-field-plant Genus)

Perennial herbs with alternate toothed or *pinnatifid lvs.* and discoid heads of purple, violet or white fls.; *bracts* of the ovoid or globose involucre in several rows, *entire*, not spiny; receptacle bristly: fr. glabrous, oblique at the base; pappus bristles merely serrulate, in several rows, rigid, graduated, the outer often very short. 30 species, in Eurasia and northern Africa; 7 in China. (Serratula, an old Latin plant-name, from *serra*, a saw.)

1. **Serratula centauroides** Linn. 麻花 (Ma Hua) (DC.P.6:668). Erect herbs, to 8 dm.; fls. purple, VI. Northeastern Asia; locally in An., Ku. Grassland.

44. **Centaurea** Linn. Star Thistle 矢車菊属 (Shih Ch'ê Chü Shu)

Herbs, rarely shrubby, with alternate entire, lobed or pinnately divided lvs.: heads ovoid or globose, variable in size and color; *bracts* of the involucre overlapping, in many rows, *with enlarged appendages or fimbriate margins*: *marginal fls. often enlarged and ray-like*; none of the corollas ligulate: fr. smooth and shining; pappus of bristles or scales, rarely none. 500 species, mostly of Eurasia and northern Africa; 2 in China. (*Centaurie*, an ancient Greek plant-name.)

1. **Centaurea cyanus** Linn. Bachelor's Button 矢車菊 (Shih Ch'ê Chü; Arrow chariot Chrysanthemum) (B.M.1027). Slender annual, to 7 dm.; fls. blue, purple, pink, white, V–VI. Introduced from southeastern Europe; locally in Ku. Cultivated, ornamental.

45. **Carthamus** Linn. 紅花属 (Hung Hua Shu)

Thistle-like annuals with alternate rigid *spiny lvs.*: flg. heads discoid, terminal, solitary or in corymbs; involucres with leaf-like outer bracts; receptacle flat, chaffy-setose: corolla 5-fid, nearly regular; filaments hairy in the middle; anthers sagittate; tails short-fimbriate: achenes glabrous, obovoid; *pappus none*. About 20 species, Canary Islands to Central Asia; one cultivated in China. (The Arabic name, referring to a color yielded by the flowers.)

1. **Carthamus tinctorius** Linn. Safflower 紅花 (Hung Hua; Red Flower) (B.M.1028). Erect herb, 3–10 dm. high; fls. orange-yellow. Eurasia; locally in Ku. Cultivated, ornamental.

XI. **Mutisieae** Mutisia Tribe 木梯菊族 (Mu T'i Chü Tsu)

Herbs or shrubs, rarely trees, with mostly entire alternate lvs. and discoid or radiate heads; bracts of the involucre overlapping, in many series: *fls.* mostly *perfect*; *corollas bilabiate* (ours) or deeply 5-cleft, or ligulate; anthers with long tails at the base: pappus of hair-like bristles. 50 genera, mostly in the Andes of South America, but also in the warm parts of Africa and Asia.

46. **Ainsliaea** DC. 龜甲鬼督郵屬 (Kuei Chia Kuei Tu Yu Shu; Turtle-shell Guardian-spirit-dwelling Genus)

Erect perennial herbs with alternate *lvs. crowded at middle or base of stem*, and *numerous small* discoid *heads in racemes*: fls. white or purplish, all perfect and fertile; corolla unequally 5-parted: pappus bristles of a single series, plumose. 25 species, in eastern Asia; 20 in China.

Key to the Species

Lvs. crowded together at the base of the stem: petioles and base of stem rufous-hairy: infl. about 50 cm. long ..... 1. *A. fragrans*

Lvs. crowded together on the middle portion of the stem: petioles and base of stem pubescent or rufous-hairy: infl. 15–20 cm. long ..... 2. *A. hui*

1. **Ainsliaea fragrans** Champ. (Be.F.192). Scapose herb, to 0.5 m.; fls. whitish, X. China; locally in Hun., Ki. Forest shade.
2. **Ainsliaea hui** Diels (Ber.N.11:109). Scapose herb, to 1 m.; fls. white, X. Eastern and central China; locally in Che., Ki. Forest.

47. **Gerbera** Cass. 大丁草屬 (Ta Ting Ts'ao Shu)

Scapose perennial herbs with basal *lvs.*; in ours white-tomentose beneath: scape naked or scaly: heads solitary, radiate: ray fls. yellow, pink or white, pistillate and fertile; disk fls. perfect and fertile; *corolla 2-lipped*; anthers tailed at the base: *fr. beaked*; pappus of many slender hairs. 20 species, in Asia and South Africa; 7 in China. (Named in honor of Traugott Gerber, a German naturalist who travelled in Russia.)

1. **Gerbera anandria** (L.) Schultz-Bip. 大丁草 (Ta Ting Ts'ao; Big-nail Plant) (H.F.3;390). Perennial herb, to 2 dm.; fls. pinkish, III–VI. Eastern Asia; locally in Hun., Hup., Ki., Ku. Grassland.

B. **LIGULIFLORAE** Ligulate-flowered Series 舌花亞科 (Shê Hua Ya K'o; Tongue-flowered Series)

Only the following tribe.

XII. **Cichorieae** Chicory Tribe 菊苣族 (Chü Chü Ts'u; Chrysanthemum-lettuce Tribe)

Herbs, rarely shrubs and very rarely trees, with *milky juice* and basal or alternate lvs.: heads all alike: fls. all ligulate, 5-toothed, and perfect; anthers sagittate but not tailed at the base; style brs. slender, not appendaged. About 60 genera. distributed throughout the world.

Treatment of *Cichorieae* contributed by G. L. Stebbins, Jr.

48. **Cichorium** Linn. 菊苣属 (Chü Chü Shu)

Perennial, biennial or annual brg. herbs, usually with deep hard roots: lvs. alternate, runcinate-pinnatifid, large mostly on the lower part of the plant: bracts of the involucre in two series, herbaceous, at least at the tip: *fls. bright blue, sometimes pink or white*: fr. truncate; *pappus* a *crown of short scales*. 7 or 8 species, in the Mediterranean region and in Abyssinia; one cultivated in China. (From an old Arabic name.)

1. **Cichorium intybus** Linn. Chicory (B.M.983). Stout perennial, to 2 m.; fls. blue. Introduced from the Mediterranean region; locally in Ki., Ku. Cultivated, vegetable.

49. **Lapsana** Linn. 稻槎菜属 (Tao Ch'a Ts'ai Shu)

Ours prostrate herbs with lyrate pinnatifid lvs. and loosely cymose infl.: involucre small, with a single series of inner bracts and a few minute outer ones: *fls. yellow*; corolla tube very short: fr. obcompressed, with 2–4 strong ribs and several lesser ones; *pappus none, or of* 2–4 *stout hooks*. About 10 species, in Eurasia; only the two following known from China.

Key to the Species

Corollas 4–5 mm. long; frs. 3.5–4.2 mm. long; pappus none or rudimentary 1. *L. apogonoides*
Corollas 8–9 mm. long; frs. 2.8–3 mm. long; pappus of 2–4 stout hooks 2. *L. uncinata*

1. **Lapsana apogonoides** Maxim. 稻槎菜 (Tao Ch'a Ts'ai) (St.P.B.18:288). Spreading herb, to 5 dm.; fls. yellow, III–IV. Eastern Asia; locally in An., Che., Hun., Hup., Ku. Moist fields.
2. **Lapsana uncinata** Stebbins (Madroño 4:154). Herb; fls. yellow, III–IV. East-central China; locally in An. Moist fields.

50. **Picris** Linn. 毛連菜属 (Mao Lien Ts'ai Shu)

Lfy.-stemmed biennial or perennial herbs, strongly *hirsute or setose* throughout: *lvs. dentate or* runcinate-*pinnatifid*: *involucres* 1–1.5 *cm. high*; their bracts rather evenly imbricated; or the outer somewhat shorter than the inner: fls. yellow: frs. reddish, transversely rugose, in ours with a short, thick beak; *pappus* white, the setae moderately stout and stiff, plumose; the *plumes not interlaced*. 35–40 species, in Eurasia and northern Africa; 2 known in China. (Greek: *picros*, bitter.)

1. **Picris heiracioides** Linn. subsp. **japonica** (Thunb.) Hand.-Maz. 毛連菜 (Mao Lien Ts'ai: Densely-hairy Vegetable) (G.M.1549). Erect herb, to 1 m.; fls. yellow, VII–IX. Eurasia, northern Africa; locally in Hup., Ki., Ku. Field weed.

51. **Tragopogon** Linn. Goat's Beard 婆羅門参属 (P'o Lo Mên Shên Shu)

Similar in habit to *Scorzonera*: heads in ours very large, 5–6 cm. high in fr.; *bracts of the involucre in a single series*: *frs.* large and long-*beaked*; pappus as in *Scorzonera*. 35 species, in Europe; one cultivated in Cha. (Greek: *tragos*, goat, and *pogon*, beard.)

1. **Tragopogon porrifolius** Linn. Salsify 婆羅門参 (P'o Lo Mên Shên; Brahman Ginseng) (B.M.983). Biennial herb, to 1.5 m.; fls. purple, IV–V. Introduced from Europe; locally in Ku. Cultivated, root vegetable.

52. **Scorzonera** Linn. 鴉葱属 (Ya Ts'ung Shu; Crow-onion Genus)

Deep rooted perennial herbs; glabrous or the stems appressed-tomentose: lvs. lanceolate or linear, rarely elliptic, in ours entire: heads large; involucres 2–5 cm. high; their *bracts* evenly *imbricated in several series*; fls. in ours yellow: *frs.* in ours pale, *beakless*; *pappus* setae stout, elongate, *long-plumose*, the plumes cobwebby and interlaced. About 100 species, in Eurasia; 6–8 in China. (French: *scorzon*, serpent; *S. hispanica* was used against snake bite.)

Key to the Species

Caudex not fibrous at apex: stems 2.5–6 dm. high, appressed-tomentose at apex: cauline lvs. well developed; lf. margins not undulate .... 1. *S. albicaulis*

Caudex fibrous at apex: stems 0.2–3 dm. high, glabrous: cauline lvs. much reduced, often bract-like; lf. margins undulate ..... 2. *S. austriaca*

1. **Scorzonera albicaulis** Bunge (*S. macrosperma* Turcz.) 野葱菊 (Yeh Ts'ung Chü; Wild-onion Chrysanthemum) (DC.P.7:117; Fa.B.5:98). Erect herb, to 1 m.; fls. yellow, V. Northeastern Asia; locally in An., Ku. Fields and thickets.
2. **Scorzonera austriaca** Willd. (Le.F.2:792). Herb; fls. yellow, IV. Eurasia; locally in An., Ku. Fields and thickets.

53. **Taraxacum** Ludwig Dandelion 蒲公英属 (P'u Kung Ying Shu)

Perennial *acaulescent* herbs: *peduncles hollow, bearing a single large many-fld. head*; bracts of the involucre in 2 series: frs. long, beaked, variously tuberculate. Species 60 or more (depending on the species concept employed), in the northern hemisphere and southern South America; about 15 described from China. (Name modified from the Arabic *Tharakhchakon*.)

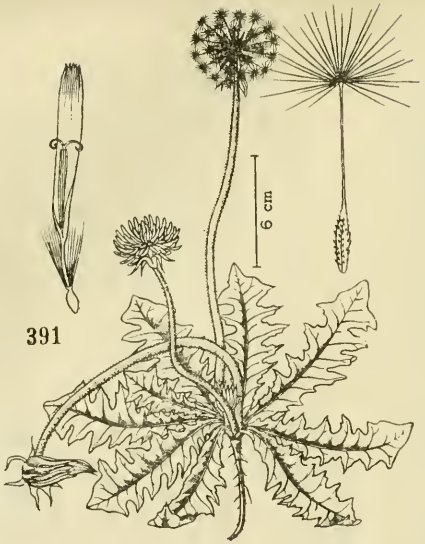
The prevalence of parthenogenetic reproduction in this genus has produced a vast number of constant, self-perpetuating forms separated from each other by minute differences. These are described as species by the systematists of northern Europe and Japan with the result that in these regions a large number of species has been described. No doubt the Chinese population of *Taraxacum* could be similarly treated, but the wiser course for the present is to recognize relatively few polymorphic species, pending a complete revision of the genus as a whole, from the cytogenetic as well as the systematic standpoint.

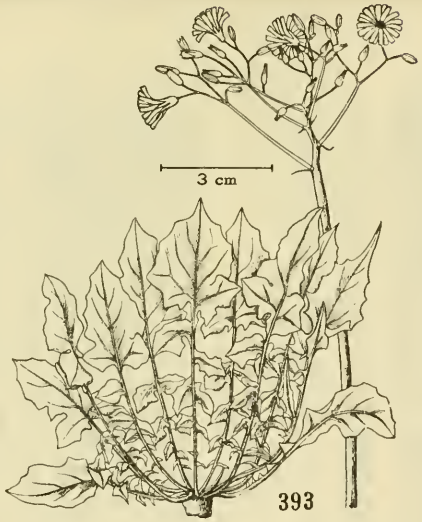
1. **Taraxacum mongolicum** Hand.-Maz. 蒲公英 (P'u Kung Ying) (Go.A.2:159). Stemless herb; fls. yellow, all seasons. China; locally in Ku. Lawns and waste places. Fig. 391.

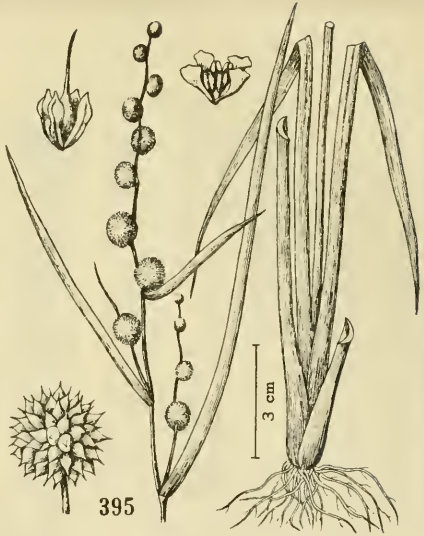
This species is the common dandelion of eastern and northern China. It differs from *T. vulgare* Lam. (*T. officinale* Weber) of Europe and America chiefly in the white-woolly apex of its scapes, its prominently corniculate inner bracts, and its achenes, which are tuberculate throughout, while those of *T. vulgare* are smooth below. The latter species has not been reported from China.

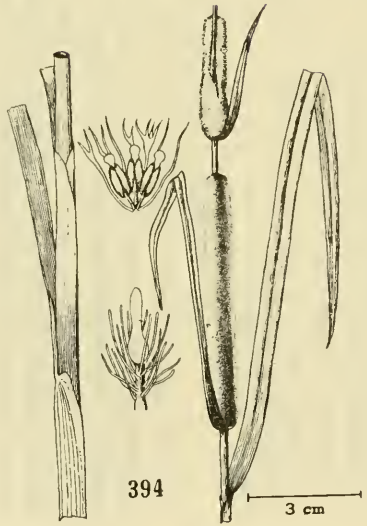
54. **Sonchus** Linn. Sow-Thistle 苦菜属 (K'u Ts'ai Shu)

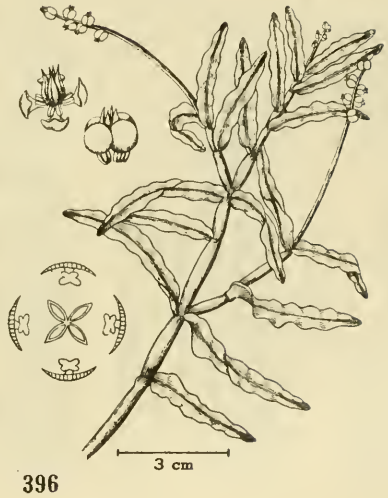
Herbs with lfy. stems and alternate pinnatifid lvs.: infl. cymose: involucres broad. *very many-fld.*; the bracts evenly imbricate: fls. yellow: frs. flattened, sometimes 4-angled, not beaked; *pappus of two types of bristles, some straight, stiff*, and relatively











391. Taraxacum mongolicum
392. Ixeris chinensis

393. Youngia japonica
394. Typha angustifolia

395. Sparganium simplex
396. Potamogeton crispus

coarse, *others* copious, *very slender and flexuous*, mostly 2-celled in cross section, adhering to clothing, etc. 40–45 species, in the eastern hemisphere; 3 introduced in and perhaps 1 or 2 native to China. Ours all cosmopolitan weeds. (The ancient Greek name.)

Key to the Species

Perennials with creeping rhizomes: heads 4–5 cm. wide ..... 1. *S. arvensis*
Annuals or biennials: heads smaller.
Lvs. not strongly spiny: frs. about 1 mm. broad, broadest above the middle, rugose ..... 2. *S. oleraceus*
Lvs. strongly spiny: frs. about 1.5 mm. broad, elliptic, broadest at the middle, not rugose ..... 3. *S. asper*

1. **Sonchus arvensis** Linn. Field Sow-Thistle 苦蕒菜 (K'u Mai Ts'ai) (G.M.1553). Erect perennial, to 1 m.; fls. yellow, VIII–X. Temperate and subtropical regions; locally in Hun., Ku. Fields and waste places.
2. **Sonchus oleraceus** Linn. Common Sow-Thistle 苦菜 (K'u Ts'ai; Bitter Vegetable) (G.M.1554). Weedy herb; fls. yellow, IV–VIII. Temperate and subtropical regions; locally in Hun., Ku. Waste places.
3. **Sonchus asper** (L.) Hill Spiny-leaved Sow-Thistle 南苣 (Nan Ts'ao) (G.M.1554). Weedy herb; fls. yellow, IV–VIII. Temperate and subtropical regions; locally in Ku. Waste places.

55. **Lactuca** Linn. Lettuce 萵苣属 (Wo Chü Shu)

Ours tall or medium-sized lfy.-stemmed herbs with *racemose-paniculate infl.s* involucres narrow, 5–30-*fld.*; their bracts various: fls. yellow, white, lavender or purplish; *corolla tube* elongate, 1/2 *as long as to equalling the ligule*, glabrous below, but with a ring of soft hairs about the apex: frs. definitely flattened, beaked, or at least strongly contracted at the apex, variously ribbed, but with the two lateral ribs always stronger than the others; pappus setae delicate and fragile, at least some of them only 2–4-celled in cross section at the base. 90–100 species, in the Old World, North America and the West Indies; 28 in China. (Latin: *lac*, milk; referring to the milky juice.)

Key to the Species

a. Involucres 12–30-fld.; their bracts evenly imbricated in several series: fls. yellow or white: frs. strongly flattened.
b. Beak of the dark brown or black frs. shorter than the body: native plants.
Beak of the frs. very short and thick, or none; frs. with 3–5 ribs on each face ..... 1. *L. raddeana*
Beak of the frs. slender, 0.7–1.3 mm. long; frs. with a single rib on each face.
Lvs. entire or remotely few-lobed: aggregate infl. broadly cylindric or pyramidal, its lower brs. elongate ..... 2. *L. indica*
Lvs. lanciniate-pinnatifid: aggregate infl. mostly cylindric or ovoid; its lower brs. not at all or only slightly longer than the middle ones .... 2a. *L. indica* ssp. *laciniata*

bb. Beak of the pale brown or mottled frs. filiform, exceeding the body: plants cultivated for the lvs. and fleshy stems ..... 3. *L. sativa*

aa. Involucres 5-fld.; their bracts consisting of a single inner series, surrounded by a number of minute, deltoid outer ones: fls. purple: frs. slightly flattened..... 4. *L. diversifolia*

1. **Lactuca raddeana** Maxim. (*L. elata* Hemsl.) 山苦菜 (Shan K'u Ts'ai) (St.P.B.19:526). Erect herb, to 1.3 m.; fls. pale yellow, VIII-IX. Eastern Asia; locally in An., Che., Hup., Ki. Woodland and clearings.

Comparison of authentic material of *L. elata* with specimens of *L. raddeana* from both Siberia and Japan reveals no significant difference between them.

2. **Lactuca indica** Linn. (*L. formosana* Hemsl., non Maxim.) (H.F.3:405). Erect herb, to 2 m.; fls. pale yellow or white, IX-X. Eastern Asia; locally in Hup., Ki., Ku. Fields, roadsides, clearings.

2a. **Lactuca indica** Linn. ssp. **laciniata** (Houtt.) Stebbins (*L. laciniata* (Houtt.)Mak.) (Mak.F.6). Erect herb, to 2 m.; fls. pale yellow or white, VII-X. Eastern Asia; locally in Ku. Fields and open places.

The laciniate-leaved form of *L. indica* is the only one commonly found in the northern part of its range, while southward only the entire-leaved form occurs. In central and eastern China the two overlap, and every intergradation between them is found.

3. **Lactuca sativa** Linn. Lettuce 莴苣 (Wo Chü) (B.M.984). Erect herb, to 1 m.; fls. yellow. Cultigen; locally in An., Che., Ki., Ku. Cultivated, leaf-vegetable.

3a. **Lactuca sativa** Linn. var. **asparagina** Bailey Asparagus Lettuce (B.M.984). Erect stem fleshy and edible. Locally in An., Ku.

4. **Lactuca diversifolia** Vaniot (Bu.G.B.12:245). Erect herb, to 1 m.; fls. purple, VII-VIII. China; locally in An., Che., Hup. Woodland, thickets.

This species is nearest to *L. sororia* Miq. of Japan and southern China, from which it is distinguished by its glabrous pedicels (glandular in *L. sororia*), 5-flowered involucres (8-12-flowered in *L. sororia*) and slightly smaller achenes.

56. **Ixeris** Cass. 剪子股属 (Chien Tsu Ku Shu)

Glabrous (rarely pubescent) mostly low herbs: lvs. entire or pinnatifid: infl. cymose: involucre of a single series of inner bracts and a few small outer ones: fls. yellow, white or purplish; corolla tube short, less than 1/2 as long as the ligule, glabrous or scabrous: *frs.* small or large, *beaked* (except in *I. lanceolata*) slightly obcompressed, 10 (in forms of *I. denticulata* 12-15) -ribbed: the *ribs equal*, prominent, sometimes alate; pappus setae white or yellow; all of them more than 4-celled in cross section at the base; ovary with 5 vascular bundles. 25-30 species, in Asia; 10-12 from China.

Species relationships within this genus (except for *I. denticulata*) are made very complex by the presence of polyploidy and parthenogenesis. Many of the forms are polyploid, sexual or parthenogenetic forms of hybrid origin. A true understanding of this genus will be attained only after careful herbarium and field studies by a specialist. The key presented is, therefore, frankly tentative.

Key to the Species

a. Stem generally with several well developed lvs. below the brs. of the infl.: involucres all on short peduncles in small axillary or terminal cymes: frs. deep brown or blackish; pappus deciduous.

b. Frs. without beak, 15-ribbed ..... 1. *I. lanceolata*

bb. Frs. beaked, 10-14-ribbed.

Frs. 11-14-ribbed, 0.6-0.7 mm. broad, the beak 0.2-0.5 mm. long: cauline lvs. broadest at or near the middle: anther tube and style brs. greenish or blackish: flg. in the autumn..... 2. *I. denticulata* ssp. *denticulata*

Frs. 10-ribbed, 0.3-0.4 mm. broad, with a beak 0.6-1 mm. long: cauline lvs. broadest at the base, salient-dentate or with narrowly deltoid or lanceolate, acuminate lobes: anther tube and style brs. yellow: flg. mostly in the spring and summer.

Cauline lvs. coarsely dentate or pinnatifid, with lobes 4-15 mm. long: inner involucral bracts not crested or tuberculate; involucre 5.5-6.5 mm. high ..... 2a. *I. denticulata* ssp. *sonchifolia*

Cauline lvs. more finely dentate, the teeth 0.5-5mm, long: at least some of the inner involucral bracts with a distinct tubercle or claw on the dorsal surface at the apex; involucre 4.5 mm. high ..... 2b. *I. denticulata* ssp. *elegans*

aa. Stems with 0-2 lvs. below the lowest brs. of the infl.: infl. more open, always terminal: frs. yellowish, brownish or reddish, always 10-ribbed or -alate; pappus persistent.

c. Erect or partly decumbent plants of fields and waste places: lvs. lanceolate or elliptic, entire, dentate, or pinnatifid: outer involucral bracts minute.

d. Plants not stoloniferous: involucres 6-10 mm. high: frs. (including beak) 4-5.5 mm. long.

e. Cauline lvs., if sessile and clasping, with short, obtuse or slightly acute auricles: frs. about 0.5 mm. broad, the ribs obtuse or somewhat acute.

Cauline lvs. cordate-clasping and ciliate-dentate at the base: involucres 1.2-2.5 mm. broad (in mature buds and in fr.); inner bracts 0.5-0.8 mm. broad; fls. yellow: frs. yellowish or buff-colored; the beak about 1/3 as long as the body; pappus yellowish... 3. *I. dentata*

Cauline lvs. various: involucres 2.2-3.5 mm. broad; the inner bracts 1-1.7 mm. broad: pappus white..... 4. *I. chinensis*

ee. Cauline lvs. sessile and auriculate: the auricles elongate, markedly acute or acuminate: frs. elliptic in outline, 0.8-1 mm. broad; the ribs

strongly acute or alate ..... 5. *I. polycephala*
dd. Plants stoloniferous: involucres 12–14 mm. high: frs. (including beak) 7–8 mm. long..... 6. *I. japonica*
cc. Creeping plant of sea beaches: lvs. mostly 3-lobed: longest outer bracts 1/3–1/2 the length of the inner.. 7. *I. repens*

1. **Ixeris lanceolata** (Houtt.) Stebbins (Youngia lanceolata (Houtt.) DC.; *Crepis integra* Miq.; *Lactuca lanceolata* (Houtt.) Mak. (DC.P.7:193;I.K.2:622). Perennial herb; fls. yellow. Eastern Asia; locally in Ku. Fields and roadsides.
2. **Ixeris denticulata** (Houtt.) Stebbins ssp. **denticulata** (*Lactuca denticulata* (Houtt.) Maxim.) 苦荬苣 (K'u Wo Chü; Bitter Lettuce) (J.B.1937:47). Brg. biennial; fls. pale yellow, IX–X. Eastern Asia; locally in An., Che., Hup., Ki., Ku. Brushland and roadsides.

2a. **Ixeris denticulata** (Houtt.) Stebbins ssp. **sonchifolia** (Bunge) Stebbins (J.B.1937:48). Brg. annual or biennial; fls. yellow, IV–VII. Fields and roadsides.

2b. **Ixeris denticulata** (Houtt.) Stebbins ssp. **elegans** (Franch.) Stebbins (J.B.1937:48). Brg. annual or biennial; fls. yellow, VI–VII. Locally in An. Fields and open places.

3. **Ixeris dentata** (Thunb.) Nakai (*Lactuca dentata* (Thunb.) C.B.Rob.) (Bo.Ma.T.49:285). Perennial herb, to 5 dm.; fls. yellow, VI–VIII. Eastern Asia; locally in An., Che. Open hillsides.
4. **Ixeris chinensis** (Thunb.) Nakai (*Lactuca chinensis* (Thunb.) Mak.; *Lactuca* versicolor (DC.) Schultz-Bip.) (Som.D.3:878;F.H.E.1:485). Herb, to 5 dm.; fls. yellow, whitish or violet, IV–VII. Eastern Asia; locally in An., Che., Hup., Ku. Fields and waste places. Fig. 392.

A very polymorphic species, which probably includes several entities. The varietal distinctions proposed by Kitamura do not hold in the Chinese flora.

A robust form of this species, with broad cordate leaves occurs in the city of Nanking. It may be a distinct subspecies or species but its correct status should be determined by further study.

5. **Ixeris polycephala** Cass. (*Lactuca polycephala* (Cass.) Benth.) (H.F.3:410). Low annual; fls. yellow, IV–V. Asia; locally in Che. Field weed.
6. **Ixeris japonica** (Burm.) Nakai (*Lactuca debilis* (Thunb.) Maxim.) 剪子股 (Chien Tzŭ Ku; Scissors Handle) (Be.F.193; B.M.T.40:575). Spreading herb; fls. yellow, II–IV. Eastern Asia; locally in Che., Ku. Field weed.
7. **Ixeris repens** (L.) Gray (*Lactuca repens* (L.) Benth.) 浜苦菜 (Pin K'u Ts'ai (Be.F. 194). Creeping herb; fls. yellow, VI–X. Eastern Asia; locally in Che. Sea beaches.

57. **Youngia** Cass. 黃鵝菜属 (Huang An Ts'ai Shu)

Herbs, ours with lyrate-pinnatifid lvs. and cymose infl.: involucres (in ours) small and with a single series of inner bracts; the outer few and very short: fls. yellow; corolla tube scabrous-pubescent, less than 1/2 as long as the ligule: *frs.* small, slightly obcompressed, *unequally ribbed*; 4 or 5 ribs stronger than the rest, contracted at the apex *but not beaked*; pappus (in ours) white, persistent; all of the bristles more than 4-celled in cross section at the base; *ovary with* 5 *or* 4 *vascular bundles.* 27 species known, in many parts of the world; 20 from China, mostly Szechuan and Yunnan.

Key to the Species

Cauline lvs. abruptly reduced, all but 1 or 2, or rarely

3 to 5, on one stem, very small, linear or bract-like: anther tube 1.75–4 mm. long.
Involucre 4–5 mm. long: corolla 4.5–6 mm. long..... 1. *Y. japonica* ssp. *japonica*
Involucre 6–7 mm. long: corolla 8–10 mm. long ..... 1a. *Y. japonica* ssp. *longiflora*
Cauline lvs. very gradually reduced, all but a few bracts in the infl. conspicuous, pinnatifid, petiolate: anther tube 0.75–1 mm. long ..... 1b. *Y. japonica* ssp. *elstonii*

1. **Youngia japonica** (L.) DC. ssp. **japonica** (*Crepis japonica* (L.) Benth.) 黃鵪菜 (Huang An Ts'ai; Yellow-quail Vegetable) (G.M.1559). Weedy herb, to 1 m.; fls. yellow, IV–VII. Eastern hemisphere; locally in Che., Hun., Ku. Waste places. Fig. 393.

1a. **Youngia japonica** (L.) DC. ssp. **longiflora** Babc. & Stebbins (Bab. & Steb. Y. 97). 3–9 dm. high; fls. yellow, IV. Southeastern China; locally in Che., Hun., Hup., Ku. Waste places.

1b. **Youngia japonica** (L.) DC. ssp. **elstonii** (Hochr.) Babc. & Stebbins (Bab. & Steb. Y.98). To 1 m. high; fls. yellow, IV–V. Southeastern China; locally in Che., Ku. Waste places.

b. **MONOCOTYLEDONEAE** Monocotyledons 单子葉植物類 (Tan Tzŭ Yeh Chih Wu Lei)

Embryo of the seed with *one cotyledon*: *lvs.* usually *parallel-veined*: *parts of the fls.* mostly *in* 3's *or* 6's: stems without annual layers or clear distinction of bark, wood and pith, the woody fibers scattered through the softer tissue.

170. **TYPHACEAE** Cat-Tail Family 香蒲科 (Hsiang P'u K'o)

Erect perennial monoecious *marsh herbs of grass-like habit*, with unbranched stems from creeping rootstocks, and with simple sessile linear entire lvs.: *fls.* small, *densely crowded in long cylindric terminal spikes*, the staminate above the pistillate; perianth of club-shaped hairs, or none in some staminate fls.; stamens one or more; ovary small, one-celled, on a slender stipe: fr. very small, one-seeded, buried in the copious hairy down. Only the following genus.

1. **Typha** Linn. Cat Tail 香蒲属 (Hsiang P'u Shu; Fragrant Rush Genus)

Characters of the family. 15 species, in all parts of the world; 8 in China. (The old Greek name.)

Key to the Species

Staminate and pistillate parts of the spike usually separated by a short interval: pistillate fls. usually with a hair-like bractlet; tip of bractlet blunt and dilated..... 1. *T. angustifolia*
Staminate and pistillate parts of the spike contiguous: pistillate fls. ebracteolate ..... 2. *T. orientalis*

1. **Typha angustifolia** Linn. 蒲草 (P'u Ts'ao; Rush) (G.M.61). Slender herb, to 4 m.; fls. VI–VII; fr. VIII–IX. Eurasia, America; locally in An., Ku. Swamps and pond margins. Fig. 394.
2. **Typha orientalis** Presl (E.P.IV.8:10). Erect herb, to 2 m.; fls. VI–VII; fr. VIII–IX. China, Japan, Philippines; locally in An., Ki. Swamps and pond margins.

171. **SPARGANIACEAE** Bur Reed Family 黑三稜科 (Hei San Lêng K'o)

Erect perennial *monoecious* marsh or aquatic herbs with sparingly branched lfy. stems, and creeping horizontal rootstocks: lvs. sessile, linear, 2-ranked: *fls. in globular glabrous heads, without involucres*: staminate fls. without perianth; stamens 3; pistillate fls. with a *perianth of* 3–6 *linear or spatulate scales*: pistillate heads becoming bur-like in fr., an aggregate of obovoid or spindle-shaped nutlets. Only the following genus.

1. **Sparganium** Linn. Bur Reed 黑三稜属 (Hei San Lêng Shu; Black-three-cornered-reed Genus)

Characters of the family. 20 species, temperate and cold regions of the northern hemisphere; one in China. (Greek: *sparganion*, a band, referring to the ribbon-like leaves.)

1. **Sparganium simplex** Huds. 三稜葉蒲 (San Lêng Yeh P'u; Three-cornered-leaf Reed) (Hegi 1: 117). Stout herb, to 2 m.; fls. VII; fr. IX; lower pistillate heads on peduncles. Eurasia, North America; locally in Che., Ku. Swamps and pond margins. Fig. 395.

172. **POTAMOGETONACEAE** Pondweed Family 眼子菜科 (Yen Tzŭ Ts'ai K'o)

Usually *submersed* herbs with *slender rootstocks*, 2-ranked *entire sometimes floating lvs.* and very small perfect fls. in fascicles or spikes; perianth wanting, or of 4 small segments; stamens 4: *fr. a small achene.* 8 genera with over 120 species, in fresh or salt water, cosmopolitan; four genera and 20 species in China.

Key to the Genera

Fls. in spikes; spike when young covered by the stipule, exserted on a peduncle at maturity: carpels sessile: staminate fls. with 4 sessile anthers ..... 1. *Potamogeton*

Fls. axillary, both staminate and pistillate usually from the same axil: the staminate fl. consisting of a single anther on a slender filament, beside which are the 2–8 carpels of the pistillate fl., in the cup-shaped involucre ..... 2. *Zanichellia*

1. **Potamogeton** Linn. Pondweed 眼子菜属 (Yen Tzŭ Ts'ai Shu; Hollow Vegetable Genus)

Aquatic herbs with slender flaccid lfy. stems and *fls. in dense cylindric* terminal spathaceous *spikes*; perianth of 4 concave segments; *anthers* 4, sessile on the perianth segments: carpels 4, 1-seeded, drupe-like in fr. 90 species, cosmopolitan; 20 in China. (Greek: *potamos*, a river; and *geiton*, a neighbor; on account of the habitat.)

Key to the Species

a. Upper lvs. floating; blades oblong, elliptic, ovate or lanceolate.

Floating lvs. small; blades 1.5–2.5 cm. long: flg. spikes not over 1 cm. long: achenes with a median cristate-dentate dorsal wing .. 1. *P. cristatus*

Floating lvs. large; blades 2–8 cm. long: flg. spikes 3–5 cm. long: achenes dorsally 3-ribbed; median rib sometimes narrowly winged 2. *P. tepperi*

aa. Lvs. all submersed.

Blades orbicular, oblong, lanceolate or linear, crisped or undulate.

Blades sessile or clasping, serrulate, obtuse: stem slender..... 3. *P. crispus*

Blades petiolate, not serrulate, mucronate: stem stout ..... 4. *P. lucens*
Blades narrowly linear or filiform ..... 5. *P. pusillus*

1. **Potamogeton cristatus** Regel & Maack (Mak. F. 890). Floating herb; fls. VII; fr. IX. Northern Asia, Japan; locally in An., Ku. Ponds and lakes.
2. **Potamogeton tepperi** A. Benn. 浮生眼子菜 (Fu Shêng Yen Tzŭ Ts'ai) (E. P. IV. 11: 62). Floating herb; fls. VII; fr. IX. Tropical Asia to Australia; locally in An., Che., Ku. Ponds and lakes.
3. **Potamogeton crispus** Linn. Curly Muckweed 菹草 (Chü Ts'ao; Marsh Weed) (G.M. 71). Submersed herb; fls. IV–VII; fr. VIII–IX. Eurasia, North America; locally in An., Che., Ku. Ponds and lakes. Fig. 396.
4. **Potamogeton lucens** Linn. Cornstalk Weed 黍桿眼子菜 (Shu Kan Yen Tzŭ Ts'ai) (Hegi 1: 191). Submersed herb; fls. VIII–IX. Eurasia, northern Africa; locally in An., Ku. Ponds and lakes.
5. **Potamogeton pusillus** Linn. Small Pondweed 絲藻 (Ssŭ Tsao; Silk Pondweed) (G.M. 72). Submersed herb; fls. VII–VIII. Eurasia, America; locally in Che., Ku. Ponds and lakes.

2. **Zanichellia** Linn. Horned Pondweed 角次藻屬 (Chio Ch'ien Tsao Shu)

Slender brg. submersed herbs with mostly opposite long-linear or filiform lvs. and sheathing membranous stipules: *fls. axillary*, unisexual, sessile, both staminate and pistillate from the same axil; *staminate fl.* consisting of *a single* stamen; *anther* exserted on a slender filament; pistillate fl. with 2–8 (usually 4) carpels: carpels beaked with a short style, often stipitate in fr. 2 or 3 species, widely distributed in freshwater ponds and streams: one in China. (Named for G. G. Zannichelli, 1662–1729, a Venetian botanist.

1. **Zanichellia palustris** Linn. var. **pedicellata** Rosen (H.F. 6: 568). Submersed herb; fls. VII; fr. IX. Asia; locally in Ku. Ponds and streams.

173. NAJADACEAE Naiad Family 茨藻科 (Tz'ŭ Tsao K'o)

Submersed marine or fresh water herbs with slender *lvs.* (ours with 3–12 broad-based *spiny teeth*), fibrous roots and brg. stems: fls. unisexual, solitary and axillary; the staminate with a double perianth-like envelope and a single stamen; *stigmas slender*; *carpels united*: fr. a sessile drupelet with hardened pericarp. Only the following genus.

1. **Najas** Linn. Naiad 茨藻屬 (Tz'ŭ Tsao Shu; Spiny Pondweed Genus)

Characters of the family. About 40 species, throughout the world; 2 in China. (Greek: *Naias*, water nymph.)

1. **Najas marina** Linn. Large Naiad 大型茨藻 (Ta Hsing Tz'ŭ Tsao) (G.M. 81). Submersed herb; fls. VII; fr. IX. Eurasia, North America; locally in Ku. Ponds and lakes.

174. JUNCAGINACEAE Arrow-grass Family 芝菜科 (Chih Ts'ai K'o)

Marsh herbs with rush-like lvs.: infl. in scapose spikes or racemes: *fls. perfect* (ours); perianth segments in two series; stamens 3–6; anthers mostly 2-celled and extrorse: *carpels* 3–6, 1–2-ovuled, *separating at maturity*. 4 genera with about 20 species, widely distributed; one genus and two or more species in China.

1. **Triglochin** Linn. Arrow-grass 三囊藻属 (San Nang Tsao Shu)

Tufted perennial marsh herbs with basal distichous sheathing lvs.; blade half-round or terete: flg. scapes exceeding the lvs.: *fls.* in *bractless* spikes or racemes; perianth segments concave, deciduous; stamens with very short filaments: *carpels* 1-seeded, *separating at maturity* from the persistent central axis. About 14 species, in temperate and subarctic regions; 2 in China. (Greek: *treis*, three, and *glochis*, points; from the three points of the mature fruit in *T. palustris*.)

Key to the Species

Carpels 6 (sometimes 3), oblong or ovoid, with recurving beaks ..... 1. *T. maritima*
Carpels 3, linear or clavate, separating from below upward ..... 2. *T. palustris*

1. **Triglochin maritima** Linn. Seaside Arrow-grass (G.M. 83). Scapose perennial, 12–20 cm. high; fls. greenish white, V–VI; fr. VIII–IX. Temperate and subarctic regions; locally in Ku. Saline or fresh marshes.
2. **Triglochin palustris** Linn. Marsh Arrow-grass (G.M. 83). Scapose perennial, 30–45 cm. high; fls. VI; fr. VIII. Temperate and subarctic regions; locally in An., Ku. Brackish or calcareous places.

175. **ALISMACEAE** Water Plantain Family 澤瀉科 (Tsê Hsieh K'o)

Marsh herbs with erect scapose stems, mostly basal sheathing lvs. and perfect or unisexual *petalous fls.*; sepals and petals 3; stamens usually 6 or more: ovaries 6 or more, *apocarpous*, becoming achenes in fr. 14 genera with 60 species, in warm and temperate regions; 3 genera and 3 or more species in China.

Key to the Genera

Fls. bisexual: lf. blades lanceolate to ovate ..... 1. *Alisma*
Fls. unisexual: lf. blades usually arrow-shaped (ours) ..... 2. *Sagittaria*

1. **Alisma** Linn. Water Plantain 澤瀉属 (Tsê Hsieh Shu)

Lf. blades lanceolate to ovate: *fls. perfect*, smaller than in *Sagittaria*; sepals and petals 3; *stamens* usually *6*: carpels arranged in a circle on a flattened receptacle, forming flat coriaceous achenes. About 10 species, cosmopolitan; one or more in China. (The Greek name.)

1. **Alisma canaliculatum** A. Br. & Bouché ex Sam. 澤瀉 (Tsê Hsieh; Water Purge) (Ark. Bot. 24A (7): 29). Erect perennial, to 0.7 m.; fls. white, VII; fr. IX; lvs. linear-lanceolate. China, Korea, Japan; locally in An., Che., Ki., Ku. Pond margins, ditches.

2. **Sagittaria** Linn. Arrowhead 慈菇属 (Tz'ŭ Ku Shu)

Perennial stoloniferous herbs with latex: early lvs. without blades; the later ones with *arrow-shaped* (ours), lanceolate or ovate *blades*: *fls. unisexual*, in whorls of 3, with membranous bracts; *stamens* usually *numerous*: ovaries many, forming flat membranous winged achenes. 30 species, in temperate and tropical regions; one or more in China. (Latin: *sagitta*, an arrow, referring to the shape of the leaves.)

Key to the Species

Lvs. reduced to flattened phyllodes, linear-oblong; no evidence of sagittate blades: plant 8–15 cm. tall ..... 1. *S. pygmaea*

Lvs. hastate or sagittate: plant 1–8 dm. tall ..... 2. *S. sagittifolia* var. *leucopetala*

1. **Sagittaria pygmaea** Miq. (E.P.IV. 15: 44). Erect, 10–15 cm. high; fls. white, VIII; pistillate fls. 1, sessile; fr. IX. Japan, Korea, China; locally in Hun., Ki. Flooded rice fields.
2. **Sagittaria sagittifolia** Linn. var. **leucopetala** Miq. Old World Arrowhead (Tz'ŭ Ku; Mother-of-Tubers) (E.P.IV. 15: 48). Erect perennial, to 0.7 m.; fls. white, VI–VII; fr. VIII–IX. Eurasia; locally in An., Che., Hun., Hup., Ki., Ku. Pond margins, ditches. Fig. 397.

There are wide extremes of variation in leaf form in *S. sagittifolia* and varieties have been described for these. Since, however, the variation in leaf form in a single plant is often quite striking it seems best to denote these extremes simply as narrow-leaved forms and broad-leaved forms. In the typical form of *S. sagittifolia* the petals are tinged with purple at the base (Hegi I. t. 20, f. 1) while in the Asiatic var. *leucopetala* they are pure white.

176. **BUTOMACEAE** 菽蒻科 (Mao Sao K'o)

Marsh herbs with *scapose erect stems* (ours), or submersed plants, with latex (except *Butomus*): fls. perfect: *fr. of several follicles.* 6 genera with 9 species, mostly in tropical America; 2 genera and as many species in Eurasia, one in China.

1. **Butomus** Linn. 菽蒻属 (Mao Sao Shu)

Glabrous erect marsh herbs with creeping rootstocks, and *without latex*: fls. pink, in simple bracteate umbels; *perianth segments* all colored and *marcescent*: stamens 9; fr. of 6 beaked many-seeded follicles. One species, in Eurasia. (Greek meaning "ox" and "cut", referring to the sharp leaves, which cut the mouth of cattle.)

1. **Butomus umbellatus** Linn. 菽蒻 (Mao Sao) (B.M. 96). Erect herb, to 1 m.; fls. pink, V; fr. VII–VIII. Eurasia; locally in Ku. Streamsides.

177. **HYDROCHARITACEAE** Frog's Bit Family 水鼈科 (Shui Pieh K'o)

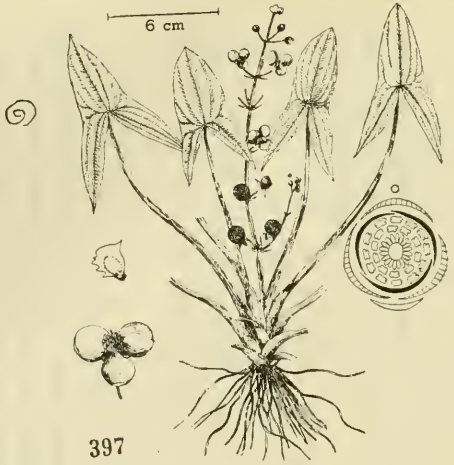
Aquatic herbs, submersed or floating, with simple entire lvs. and unisexual or polygamous regular *petaloid fls.* arising from a bracted spathe: sepals and petals 3; stamens 3–12, distinct or united: *ovary inferior*, *syncarpous*, 1–3-celled, ripening under water, indehiscent. 14 genera with 40 species; 9 genera and as many species in China.

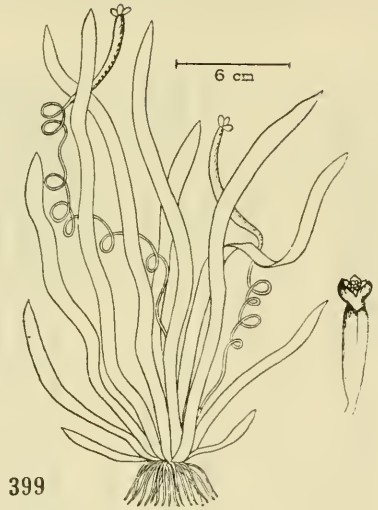
Key to the Genera

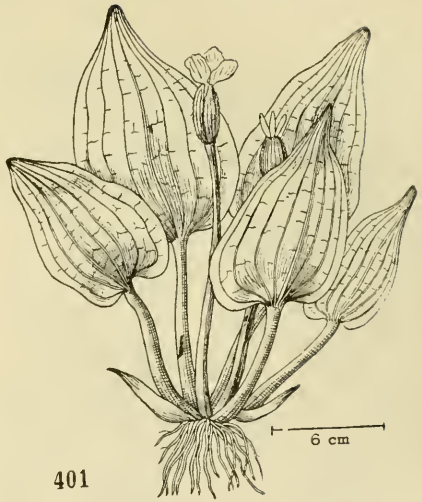
A. Plants with elongated submerged brg. stems and verticillate lvs. ..... 1. *Hydrilla*
AA. Plants stemless or with creeping rootstocks.
  Lvs. long and narrow, ribbon-like: perianth single ..... 2. *Vallisneria*
  Lvs. especially the floating ones, broad: perianth double.
    Fls. white: lf. blades mostly orbicular-cordate ..... 3. *Hydrocharis*
    Fls. bluish: lf. blades mostly linear, lanceolate or ovate ..... 4. *Ottelia*

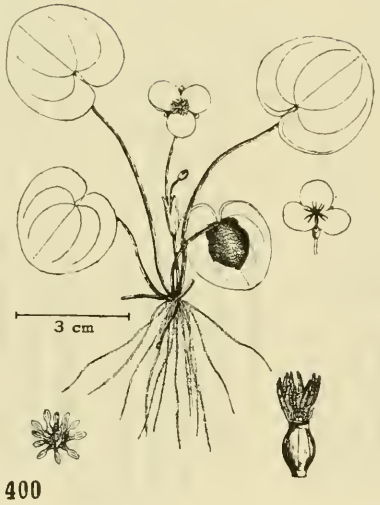
1. **Hydrilla** L. C. Rich. 黑藻属 (Hei Tsao Shu)

A *slender branched* submersed herb with thin narrowly oblong *verticillate lvs.* and small *unisexual fls.*: staminate fls. escaping from their sheaths and floating free on the water; stamens 3, with large reniform anthers: pistillate fls. sessile and persistent; ovary one-celled, with 2–3 oblong seeds. One species: temperate and tropical parts









397. Sagittaria sagittifolia
398. Hydrilla verticillata

399. Vallisneria spiralis
400. Hydrocharis dubia

401. Ottelia alismoides
402. Arundinaria amara

of the world. (Greek: *hydr*, water, and "rill"; referring to the habitat.)

1. **Hydrilla verticillata** (L.f.) Royle 黑藻 (Hei Tsao; Black Pondweed) (H.F. 5: 659). Submersed herb; fls. greenish white, VI–VIII; fr. VII–IX. Eurasia, Australia; locally in An., Che., Hup., Ki., Ku. Streams, ponds, and lakes. Fig. 398.

2. **Vallisneria** Linn. Tape Grass 苦草属 (K'u Ts'ao Shu)

Dioecious submersed tufted *stemless* herbs with long thin *linear lvs.*: staminate fls. numerous, borne in ovoid heads on short pedicels which break allowing the mature fl. heads to escape and float on the water surface where their pollen is shed: pistillate fls. solitary on long scapes which lengthen so that at maturity the fls. float on the surface of the water where pollination takes place, but later coil up spirally, pulling the ovaries under water where the frs. mature; perianth segments 3; stamens usually 3: fr. berry-like. 3–4 species, in all warm regions; one in China. (In honor of A. Vallisneri, an early Italian botanist.)

1. **Vallisneria spiralis** Linn. Eel Grass 苦草 (K'u Ts'ao; Bitter Grass) (G.M. 94). Submersed herb; fls. IX; fr. X. Eurasia, Australia, North America; locally in An., Ku. Canals and deep streams. Fig. 399.

3. **Hydrocharis** Linn. 水鼈属 (Shui Pieh Shu; Water Turtle Genus)

Dioecious *floating herbs* with creeping rootstocks, long-petiolate *orbicular-cordate lvs.* and white fls.: staminate fls.: 2–3 together: pistillate fls. solitary; stigmas solitary: testa of the seed pulpy, filled with spiral vessels. 2 species, one in China. (Greek: *hydro*, water, and *chairein*, to rejoice.)

1. **Hydrocharis dubia** (Bl.) Backer (*H. morsus-ranae* Linn. var. *asiatica* (Miq.) Mak.; *H. asiatica* Miq.) Asiatic Frog's Bit 白蒻 (Pai P'in; White Marsilea) (Mak. F. 884). Floating herb; fls. white, VII–IX; lvs. with a thickened spongy pad in the center. Asia, East Indies; locally in An., Che., Ku. Ponds and lakes. Fig. 400.

4. **Ottelia** Pers. 水車前属 (Shui Ch'ê Ch'ien Shu)

Stemless submerged herbs with narrow *crowded lvs.*, some long-petioled and floating, with broad (*lanceolate or ovate*) blades: *fls. bluish*, solitary, *perfect*, on a tubular 2-fid spathe; petals large, obovate or orbicular, with fleshy appendages at the base; stamens 6–15: ovary oblong, beaked, almost 6-celled, 6-valved in fr.: seeds many, with pulpy testa. 6–7 species: tropical and subtropical; one in China.

1. **Ottelia alismoides** Pers. 水車前 (Shui Ch'é Ch'ien; Water-Plantain) (H.F. 5: 662). Aquatic herb; fls. lavender-purple, IX; fr. X. Asia, East Indies, Australia; locally in An., Hup., Ki., Ku. Canals, deep streams. Fig. 401.

178. **GRAMINEAE** Grass Family 禾本科 (Ho Pên K'o; Cereals Family)

Herbs or woody plants with *hollow* or sometimes solid stems (*culms*) and 2-ranked (*distichous*) usually parallel-veined lvs. consisting of a usually flat sessile blade and a sheath which encloses the culm and has overlapping margins, with a membranous hyaline or hairy appendage (*ligule*) on the inside at the junction of blade and sheath: *inflorescence of spikelets* arranged in spikes, spikelike racemes or panicles, usually terminal: spikelet consisting of one or more flowers (florets), variously modified,

subtended or enclosed by a pair of outer scales (glumes): perfect floret consisting of a sessile ovary bearing two (rarely 1 or 3) feathery stigmas, usually 3 stamens with delicate filaments, and two (rarely 3) small hyaline scales (lodicules) representing the perianth, enclosed by lemma (outside) and palea (inside, next to the rachilla): *fruit a caryopsis* (grain) in which the ovary wall and coat of the single seed are united. About 600 genera with over 6,000 species, cosmopolitan; about 160 genera and 600 species in China.

For the benefit of students beginning their study of the grasses, Mrs. Chase has kindly prepared in non-technical language an introduction to the special terms used in descriptions for this family. She has also provided her own drawings illustrating the complicated structures involved.

INTRODUCTION TO GRASSES

By Agnes Chase

The grass family is one of the largest families of plants and is the most widely distributed one. It consists of more than 650 genera, including the 38 or more genera of bamboos. To facilitate study of so great a number the grasses have been divided into 14 tribes, all of them represented in the flora of the Lower Yangtse.

The flowering parts of grasses differ greatly in general appearance from the flowering parts of other plants and it is necessary to understand their structure in order to study the grasses. Fig. A shows a grass stem, called the *culm*, made up of a series of *nodes* and *internodes*, the nodes (joints) solid, the internodes usually hollow, enclosed in a *sheath*, which surrounds the culm like a tube split down one side, and with a *blade* which is usually strap-shaped, flat or with rolled margins. The sheath and blade form a specialized *leaf*, and the leaves are borne in 2 ranks, alternate, on opposite sides of the culm. At the junction of sheath and blade on the inside is a small scale or row of hairs, called the *ligule*. The root, stem, and leaves are the vegetative parts of the plant. (See Fig. A). In grasses the vegetative parts are more uniform and characteristic than in most other families. Having stem and leaves it can be readily decided whether or not a given plant is a grass. (The only plants that may reasonably be mistaken for grasses are the sedges. In these the culms are solid, not jointed, and are commonly 3-sided; the leaves are always 3-ranked and the sheaths always closed.)

The flowers of grasses are small and inconspicuous. They consist of a single *pistil* with a 1-celled ovary with a single ovule, with 2 styles, each with a feathery stigma (1 in *Zea mays*, elongated and stigmatic over the surface), and 3, (rarely 1 or 6) *stamens* with delicate filaments and 2-celled *anthers*. Two minute scales (*lodicules*), situated back of the pistil become turgid at blooming time and force open the enveloping scales. Grasses are wind-pollinated (Fig. B).

The grass flower is reduced to the essential organs, the calyx wanting and the corolla represented by the minute lodicules. This reduced flower is subtended by a 2-nerved bract (the *palea*) and is borne in the axil of a second bract (the *lemma*). The flower, with its lemma and palea is termed the *floret*. (Fig. C.)

The ripened ovary (the *grain* or *caryopsis* (Fig. D)) consists of a small embryo lying at the base of a mass of starchy endosperm, which is the store of food used by the infant plantlet when it begins to grow. (The germ of a kernel of corn is the embryo, the remainder of the kernel is starchy endosperm.)

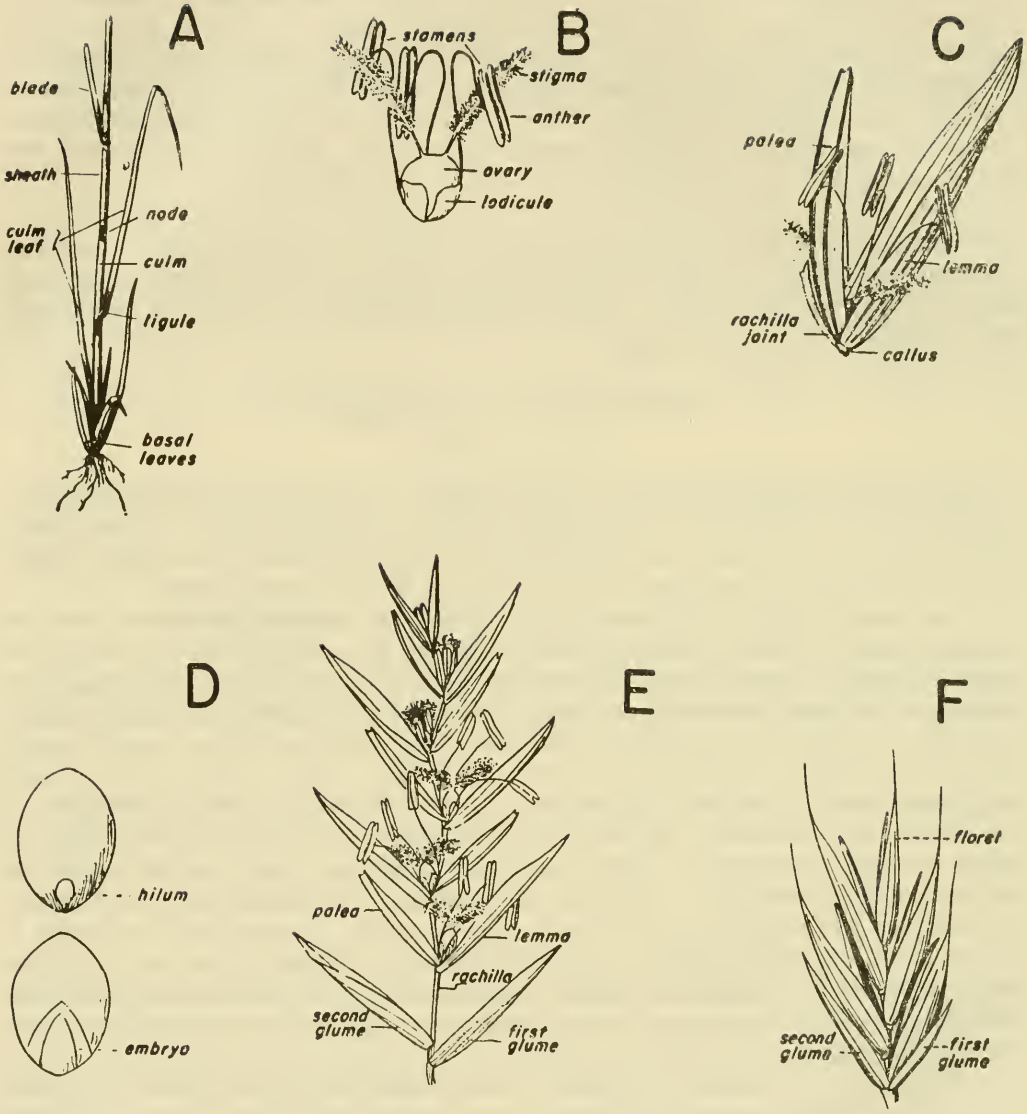


Fig. A. Vegetative part of a grass plant.

Fig. B. Grass Flower.

Fig. C. Grass floret.

Fig. D. Two views of a grass grain.

Fig. E. Diamgram of a grass spikelet.

Fig. F. Generalized grass spikelet.

Fig. G. Diagram of a flowering branch.
Fig. H. Base of plant and underground parts of *Poa pratensis*.
Fig. I. Forms of inflorescence: panicle, raceme, spike.
Fig. J. *Heteropogon contortus*: (a) single joint of raceme showing awned sessile (perfect) spikelet partly hidden by the large pediceled (sterile) spikelet; (b) perfect spikelet from which sterile spikelet has fallen; (c) base of fertile spikelet showing the sharp callus formed by the obliquely disarticulating rachis joint; (d) raceme, showing homogamous pairs of spikelets at base; (e, f) diagrams showing structure of the raceme and points of disarticulation.

The florets are borne singly on an axis, the *rachilla*, (Fig. E) which disarticulates usually below each floret, the rachilla-joint remaining attached at the back of the palea. (Fig. C). In some 1-flowered spikelets the rachilla is prolonged behind the palea as a slender, often hairy, bristle.

Below the florets are 2 bracts (the *glumes*), the first wanting in a few genera (Fig. F). The glumes, rachilla, and florets together form the spikelet, which is a flowering branch (Fig. G) reduced to the essential organs. This simple arrangement is modified in various ways, but everything in any spikelet can be identified by its position as one of these organs. Glumes and lemmas are often hairy or variously nerved, the nerves sometimes extending into awns.

Before studying the spikelets one must observe the relatively few specializations of the vegetative parts. As in other plants, stems or parts of stems may be underground (*rhizomes* or rootstocks), borne at the base of the main culm under the earth. They are jointed like the culms and bear scales which correspond to leaves; shoots are produced in the axils of the scales as branches are borne in the axils of leaves. Sod-forming grasses have this kind of underground stem (Fig. H). In some grasses the shoots from the base extend over the surface of the ground instead of beneath it. Such shoots are *stolons*. Both rhizomes and stolons produce roots from the nodes. Bermuda grass produces either rhizomes or stolons and sometimes both from the same plant.

Grasses may be annuals, germinating, seeding and dying in a single season, like the weedy bromes and wild oats, or perennials like orchard grass, Bermuda grass, and the long-lived bamboos.

It is chiefly by the modifications of the spikelets and their arrangement in the inflorescence that grasses are classified into genera and tribes. Theoretically the spikelet is a reduced leafy branch. In the generalized spikelet shown in Fig. E the likeness to a jointed culm with 2-ranked leaves (Fig. G) is readily seen, the glumes and lemmas corresponding to sheaths, their blades not developed. The palea, with two nerves and with its back to the axis, corresponds to a minute bract (the *prophyllum*) borne at the base of a branch in the axil of a sheath. The prophyllum is always 2-nerved, with its back (that is, the space between the nerves) against the main axis and its margins clasping the young branch. The flower, also, is theoretically an ultimate branchlet. In the flower-bearing lemmas, therefore, the palea is developed, while in the glumes, bearing no flowers, there are no paleae. Glumes and lemmas are, morphologically, reduced leaves, the lower pair, not flower-bearing, being termed *glumes*, the flower-bearing ones being termed *lemmas*. (See Fig. E.)

The jointed axis of the spikelet (the *rachilla*) corresponds to the jointed culm and, like it, usually breaks at the nodes, the internode (the part of the rachilla between two nodes) remaining attached to the floret at its base (Fig. G), just as in a broken grass stem the internode of the culm remains with the sheath that surrounds it; that is, the break normally comes just under the node. *Rachis* (which means the spine, or backbone) and *axis* (the imaginary central line of any body) are often used interchangeably as botanical terms. In most recent works on grasses and in these descriptions, axis is used for the main axis of a compound inflorescence, rachis for the axis or support of the spikelets. In Fig. I are shown the axis of a panicle (a) and the rachis of a raceme (b); the rachis of the spike (c) is concealed by the overlapping spikelets.

Spikelets are borne pediceled (that is, on a pedicel or foot stalk) or sessile (without a pedicel) in leafless panicles, racemes, or spikes. These different types of

inflorescence grade imperceptibly into each other. The axis and branches of a panicle and the rachis of a raceme or spike may be as elaborately modified and specialized as may be the parts of a spikelet. The axis, rachis, or branches may be continuous (not jointed), or articulate (jointed) and usually disarticulating (breaking up). The breaking up takes place at definite points and has to do with scattering the seed. The point of disarticulation is the same in grasses of the same kind (or genus) and is usually alike in related genera, and for this reason is of great importance in the classification of grasses. When there are no joints in the axis or branches, the disarticulation comes in the spikelet, either above the glumes and between the florets or below the glumes.

Spikelets differ in the number of florets (1 in *Agrostis*, to many in *Eragrostis*); the parts vary in relative size; the rachilla-joints slender or thick, short or long; the node at the base of the floret (*callus*) sometimes prolonged into a sharp point, as in *Aristida* and *Stipa*. Glumes may be very large as in wild oats, or reduced to rudiments or suppressed as in most species of *Paspalum*. Lemmas are so characteristically modified that they form one of the principal distinguishing characters for identifying genera and species and are so used in the keys.

The arrangement of spikelets in the inflorescence is as important as are the variations of spikelets themselves. They are borne pediceled (that is on a pedicel or footstalk) or sessile (without a pedicel), in leafless panicles (*Festuca*, *Poa*, *Eragrostis*), racemes (*Andropogoneae*) (Fig. J) or spikes (*Hordeae*) (Fig. I, c).

The tribes are largely based on a combination of the structure of the spikelet and the structure of the inflorescence.

1. Bamboo Tribe (*Bambuseae*)—Woody plants of great size; culm sheaths very large, their blades much smaller, not petiolate; leaf sheaths much smaller, their blades petiolate, elongate.

2. Fescue Tribe (*Festuceae*)—Spikelets 2-to many-flowered, the inflorescence (mostly less specialized than in the other tribes) in open to dense panicles, contains the greatest number of genera and is the most widely distributed.

3. Oat Tribe (*Aveneae*)—Like Festuceae but glumes enlarged, florets fewer, mostly awned from the back; *Avena* (the oat) the most important genus.

4. Fingergrass Tribe (*Chlorideae*)—Spikelets 1-to-several-flowered on one side of a continuous rachis; inflorescence of 2- to several 1-sided spikes, these few to several, racemose or digitate; Kou Ya Kên Shu Cynodon, the commonest genus.

5. Barley Tribe (*Hordeae*)—Spikelets sessile on a simple axis; the rachis, rather than the spikelets specialized. The cereals, wheat, barley and rye, belong to this relatively small tribe.

6. Bentgrass Tribe (*Agrostideae*)—Spikelets 1-flowered; inflorescence an open to spike-like panicle, the spikelets awned or awnless, conspicuously awned in *Stipa* and *Aristida*.

7. Chieh Lu Ts'ao Ts'u (*Zoysiae*)—A single genus, *Zoysia*, with only two species in our flora. Spikelets nearly sessile in a single short spike, the spikelets falling entire; first glume wanting, the second glume firm, pointed; a low densely tufted perennial.

8. Yi Ts'ao Ts'u. (*Phalarideae*)—Spikelets with one perfect floret and two sterile florets below (minute in our one genus, *Phalaris*); panicle pale, spike-like.

9. Rice Tribe (*Oryzeae*)—Spikelets with one perfect floret, laterally compressed, in terminal panicles; annual or perennial swamp grasses. *Oryza*, rice, is the most important genus.

10. Indian Rice Tribe (*Zizanieae*)—Spikelets 1-flowered, unisexual or perfect, falling entire; aquatic or subaquatic grasses.

11. Shu Ts'u (*Paniceae*)—Spikelets dorsally compressed, with 1 perfect terminal floret and a sterile or staminate floret below; lemma and palea of floret indurate; spikelets falling entire; a tribe of many genera, mostly tropical and subtropical.

12. Yeh Ku Ts'ao Ts'u (*Arundinellae*)—Spikelets slightly compressed laterally, with 1 perfect terminal awned floret and a staminate floret below; glumes persistent or readily falling. A small tribe with but one genus in our flora.

13. Kao Liang Ts'u (*Andropogoneae*)—Spikelets typically in pairs, 1 sessile and perfect, the other pediceled and staminate or neuter, solitary or numerous, arranged along a jointed or continuous axis, forming racemes, these borne singly on the branches, or paired or in fascicles, in a compound inflorescence; or the racemes numerous along a stout or slender axis, forming dense to open panicles; spikelets with 1 perfect floret and a sterile lemma below; the spikelets falling entire; a large tribe, including sugarcane and kaoliang. The arrangement of spikelets is variable and in some genera (*Hackelochloa*, *Heteropogon*, *Themeda*, and others) complex; see generic descriptions.

14. Yü Shu Ch'u Ts'u (*Maydeae*)—Spikelets unisexual; the staminate in pairs, 2-flowered, falling entire; the pistillate single, 2-flowered, the lower floret sterile, in *Coix* enclosed in indurate beadlike sheathing bracts, the staminate inflorescence protruding through the orifice at the apex, readily falling; in *Zea* the staminate spikelets numerous in long racemes in a large terminal panicle; pistillate inflorescence in the axils or the leaves, the spikelets in several to many rows on a thickened rachis (the cob) the whole enclosed in the numerous foliaceous bracts (husks), the elongate styles extending from the summit as a mass of silky threads.

The treatment of *Gramineae* was contributed by Y. L. Keng, recognized authority on Chinese grasses, but several years have passed since the manuscript was prepared. It was not feasible to communicate with Dr. Keng so Agnes Chase, of the Smithsonian Institution in Washington, has kindly brought the manuscript up to date, as to nomenclature, while endeavoring to maintain Dr. Keng's concept of the relationships of genera and species in this very technical and important family.

Key to the Tribes

A. Spikelets many-1-fld.; sterile florets (when present) above the fertile, disarticulating above (rarely below) the glumes; the rachilla frequently prolonged behind the upper palea ..... A. FESTUCOIDEAE

B. Culms woody, perennial ..... I. *Bambuseae*

BB. Culms herbaceous, annual.

C. Spikelets sessile or nearly so, arranged in spikes or spike-like racemes.

Spikelets on one side of the rachis; spikes many to 1, paniculate, racemose, or digitate ..... IV. *Chlorideae*

Spikelets on opposite sides of the rachis; spike terminal, single ..... V. *Hordeae*

CC. Spikelets pedicelled (subsessile in *Lophatherum* and *Brachypodium*), arranged in open or contracted panicles, or rarely in racemes.

D. Spikelets many-2-fld.

Second glume usually shorter than the first floret; awns, when present, usually terminal or rarely from the bifid apex of the lemma ..... II. *Festuceae*

Second glume equalling or longer than the first floret; awns, when present, usually on the back of the lemma ..... III. *Aveneae*

DD. Spikelets 1-fld.

Spikelets disarticulating above (below in Alopecurus, Polypogon, Phaenosperma and Sphaerocaryum) the glumes; lemmas either similar in texture to the glumes or thicker than the latter at maturity.... VI. *Agrostideae*

Spikelets disarticulating below the glumes; lemmas hyaline or thinner than the glumes..... VII. *Zoysieae*

AA. Spikelets 2–3-fld.; the terminal floret perfect (except in sterile spikelets), the rachilla never prolonged behind the upper palea.

E. Spikelets 3-fld.; florets disarticulating above the glumes ..... B. PHALARIOIDEAE

Spikelets 3-fld., or if 1-fld., the lateral florets represented by 2 scale-like lemmas; glumes well-developed or sometimes exceeding the terminal floret ..... VIII. *Phalarideae*

Spikelets 1-fld.; glumes minute or obsolete.

Spikelets perfect, laterally compressed; glumes reduced or wanting; lemmas rigid..... IX. *Oryzeae*

Spikelets unisexual, the pistillate awned, the staminate awnless: stamens 6 or more..... X. *Zizanieae*

EE. Spikelets 2-fld.; florets disarticulating below the glumes (except in *Isachne* and in the tribe *Arundinelleae*) ..... C. PANICOIDEAE

F. Lemma and palea indurate or membranaceous, thicker than the glumes (except in *Pseudoraphis* of *Paniceae*).

Spikelets disarticulating below the glumes .. XI. *Paniceae*

Spikelets disarticulating above the glumes .. XII. *Arundinelleae*

FF. Lemma and palea membranaceous or hyaline, thinner than the glumes.

Spikelets perfect or the fertile ones mixed with the sterile..... XIII. *Andropogoneae*

Spikelets unisexual, the staminate and pistillate in separate infls. or in different parts of the same infl..... XIV. *Maydeae*

Subfamily A. **FESTUCOIDEAE**

Spikelets many-1-fld., with *sterile florets* (when present) *above the fertile*, laterally (rarely dorsally) compressed or subterete, *disarticulating above* (rarely below) *the glumes*, the *rachilla* frequently *prolonged behind the upper palea.*

Tribe I. **Bambuseae** Bamboo Tribe 竹族 (Chu Ts'u)

Spikelets many-2-fld., the florets perfect or the upper ones in ours rudimentary, the rachilla disarticulating above the glumes and between the florets, prolonged behind the upper palea into a naked or glumiferous stipe; glumes 2–1, rarely more or wanting, shorter than the succeeding lemmas; lemmas many-nerved, awnless or with short straight terminal awns; palea 2-keeled or rarely convolute; lodicules usually 3; stamens 6 or 3; styles 3–2, often grown together at the base; fr. free, in ours a true caryopsis:

woody perennials with either monopodial or sympodial rhizomes, oblong-lanceolate blades and short petioles articulated with the sheaths, and with spikelets arranged in panicles or racemes, or more frequently in tufts or false whorls at the nodes of the flg. brs.

Key to the Genera

A. Culms terete: spikelets loosely or densely arranged on a true continuous rachis, never intermingled with spathes.
  Stamens 6 ..... 1. *Sasa*
  Stamens 3.
    Infl. an open panicle or raceme, exserted or included below in sheaths or sheathing spathes ..... 2. *Arundinaria*
    Infl. a spike-like raceme, subtended by a series of closely set scales ..... 3. *Brachystachyum*
AA. Culms subterete, flattened or grooved on one side: spikelets arising from nodes of the flower-branchlets, intermingled with spathes.
  Culms fruticose or arborescent; brs. usually two from each node.... 4. *Phyllostachys*
  Culms low or dwarf; brs. several from each node, verticillate ..... 5. *Shibataea*

1. **Sasa** Makino & Shibata 箬竹属 (Jo Chu Shu; Broad-leafed-bamboo Genus)

Shrubs: rhizomes monopodial: culms terete, with solitary brs.: spikelets in open panicles or racemes: *stamens* 6. About 12 species in eastern Asia, one in China. (The Japanese name.)

1. **Sasa sinica** Keng (Si. 7: 748). Shrub, 1–1.5 m. high; fls. V; fr. VI. Southeastern China; locally in An., Che. Roadsides.

2. **Arundinaria** Michx. 苦竹属 (K'u Chu Shu)

Trees or shrubs: rhizomes monopodial: culms terete, usually with fascicled brs.: spikelets as in *Sasa*: *stamens* 3. About 100 species, in tropical and temperate regions; 30 in China. (Latin: *arundo*, a reed.)

Key to the Species

Stigmas 2: lf. blades broad, up to over 4 cm. wide..... 1. *A. latifolia*
Stigmas 3: lf. blades narrower, mostly not over 2 cm. wide.
  Sheaths not fimbriate at the summit: palea usually exceeding the lemma.. 2. *A. amara*
  Sheaths fimbriate at the summit: palea usually shorter than the lemma.. 3. *A. varia*

1. **Arundinaria latifolia** Keng (Si. 6: 147, 153). Shrub, to 1 m.; fls. (occasional) 1; fr. unknown. Southeastern China; locally in An., Che., Ku. Brushy slopes.
2. **Arundinaria amara** Keng 苦竹 (K'u Chu; Bitter Bamboo) (Si. 6: 148, 154). Shrub, 1–4 m. high; fls. V; fr. VI. Southeastern China; locally in An., Che., Ku. Exposed or sandy slopes. Fig. 402.
3. **Arundinaria varia** Keng 華東苦竹 (Hua Tung K'u Chu; East-China Bitter-bamboo) (Si. 6: 150, 155). Shrub, to 1 m.; fls. VI; fr. unknown. Eastern China; locally in Che. Open slopes.

3. **Brachystachyum** Keng 短穗竹属 (Tuan Sui Chu Shu; Short-spikeleted-bamboo Genus)

Shrubs: rhizomes monopodial: culms terete, with fascicled brs.: spikelets in spike-

like *racemes subtended by* a series of *closely set scales*: stamens 3. One species in southeastern China. (Greek: *brachy*, short, and *stachys*, spike; alluding to the short spike-like raceme.)

1. **Brachystachyum densiflorum** (Rendle) Keng (*Arundinaria densiflora* Rendle) (F.H.E. 3: 434). Shrub, to 3 m. Southeastern China; locally in Che., Ku. Open slopes. Fig. 403.

4. **Phyllostachys** Sieb. & Zucc. 毛竹屬 (Mao Chu Shu; Hairy-bamboo Genus)

Trees or shrubs: rhizomes monopodial: culms semiterete or the internode flattened or grooved on one side, usually with 2 *brs. at each node*: spikelets arising from the nodes of flower-branchlets, intermingled with spathes, in spikes or glomerate fascicles; the latter subtended by scales as in *Brachystachyum*. About 30 species, in eastern Asia, 15 in China. (Greek: *phyllos*, leaf, and *stachys*, spike.)

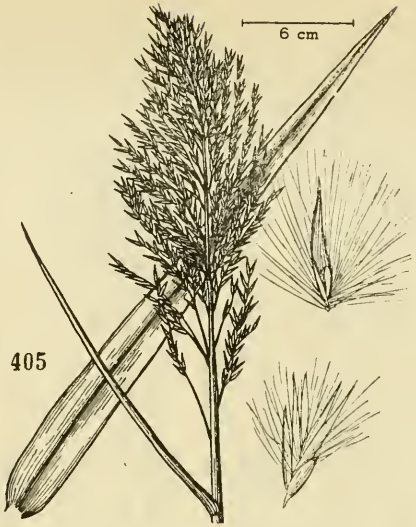
Key to the Species

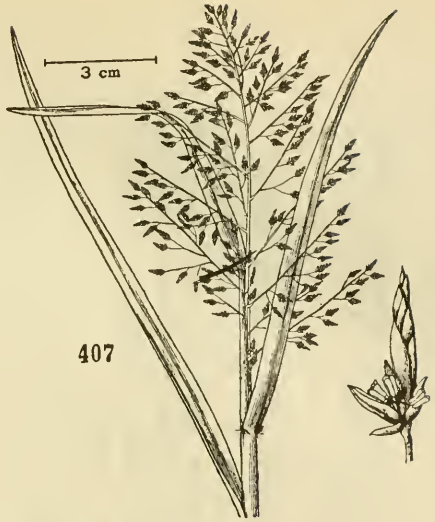
a. Culms 5–20 cm. in diam.		
Culm-sheaths hairy, blackish	1.	*P. edulis*
Culm-sheaths glabrous	2.	*P. sulphurea* var. *viridis*
aa. Culms 0.5–3.0 cm. in diam.		
b. Spikelets in spathate spikes, the spathe distinctly foliaceous at the apex	3.	*P. bambusoides*
bb. Spikelets in spike-like clusters or globose heads; the spathe acuminate or bearing a much reduced blade at the apex.		
c. Culms fruticose or somewhat arborescent, 1–2 cm. or more thick,		
Culms smooth, lustrous, becoming nigrescent the second year..	4.	*P. nigra*
Culms rather rough, dull, remaining green or yellowish brown	4a.	*P. nigra* var. *henonis*
cc. Culms suffruticose, about 1 cm. thick.		
d. Partial infl. on brs. of the previous year.		
Spikelet-clusters on leafless brts. or overtopped with a few blades	5.	*P. nidularia*
Spikelet-clusters mostly terminating the lfy. shoots	6.	*P. congesta*
dd. Partial infl. on brs. of the current year.		
Spikelet-clusters 5–10-spiculate; spikelets 3–6-fld	7.	*P. dubia*
Spikelet-clusters 3-spiculate; spikelets 2–3-fld.	8.	*P. stauntoni*

1. **Phyllostachys edulis** (Carr.) Houzeau de Lehaie (R.M. 891). Tree, to 20 m. China, Japan; locally in Che. Planted.
2. **Phyllostachys sulphurea** Riv. var. **viridis** Young (Wash. J. 27: 345). Tree, to 14 m. Culm and brs. green. Japan, China. Planted.
3. **Phyllostachys bambusoides** Sieb. & Zucc. 剛竹 (Kang Chu; Rigid Bamboo) (R. M. 891). Tree, 3–6 m. high; fls. VII; fr. VIII. China and Japan; locally in An., Ki., Ku. Commonly cultivated.

"*Phyllostachys reticulata* (Rupr.) Koch, to which this species has been referred, was based on a mixture of sterile specimens, without culm-sheaths, representing several species in at least two distinct genera, and the specific description includes them all."—F. A. McClure.

4. **Phyllostachys nigra** (Lodd.) Munro 紫竹 (Tzŭ Chu; Purple Bamboo) (R.M. 892).





403. Brachystachyum densiflorum
404. Phyllostachys dubia

405. Phargmites communis
406. Neyraudia montana

407. Eragrostis ferruginea
408. Lopatherum gracile

Shrub, 1–4 m. high; culm becoming purple-black. India, China, Japan; locally in Che., Ki., Ku. Commonly cultivated.

4a. **Phyllostachys nigra** (Lodd.) Munro var. **henonis** (Mitf.) Stapf ex Rendle (Tan Chu; Vivid Bamboo) Habit as in *P. nigra*. China and Japan; locally in An., Ki., Ku. Commonly cultivated.

"*Phyllostachys puberula* (Miq.) Munro (Ga. C. Ser. VI. 773–774. 1876), to which this var. has been refeired, is a synonym of var. *henonis*."—F. A. McClure.

5. **Phyllostachys nidularia** Munro (Ga. C.n.s. 6: 773, 774). Subshrub, 1–2 m. high; fls. V; fr. VI. China and Japan; locally in An., Che., Ki., Ku. Brushy slopes.
6. **Phyllostachys congesta** Rendle 水竹 (Shui Chu; Water Bamboo) (F.H.E. 3: 438). Subshrub, to 1.5 m.; fls. VII; fr. VIII. Central, eastern and southern China; locally in Che., Ku. Brushy slopes.
7. **Phyllostachys dubia** Keng (Si. 11: 407). Subshrub, to 1 m.; fls. VI. Eastern China; locally in An., Ku. Open slopes. Fig. 404.
8. **Phyllostachys stauntoni** Munro (Linn. Tr. 26: 37). Subshrub, to 1 m.; fls. VI. Eastern China; locally in An., Ki., Ku. Open slopes.

5. **Shibataea** Makino 倭竹属 (Wo Chu Shu)

Low shrubs: rhizomes monpodial: culms flattened on one side, with 2-*several brs. at each node*: spikelets as in *Phyllostachys*. A few species in China and Japan. (After Keita Shibata, a Japanese botanist.)

Key to the Species

Blades to 12 cm. long; margin, seen from beneath, sparsely weakly spinulose ..... 1. *S. kumasasa*
Blades not more than 9 cm. long; margins cartilaginous, strongly spinulose 2. *S. hispida*

1. **Shibataea kumasasa** (Zoll.) Makino 倭竹 (Wo Chu; Dwarf-bamboo) (R.M. 892). Low shrub of tufted habit with rather broad thin lvs., 1–2 m. high; fls. unknown. Eastern China and Japan; locally in An., Che. Shady places.

Another small bamboo, with culms 30–60 cm. tall, short verticillate branches and 2 spikelet clusters at nodes, growing gregariously on exposed ground by a village near Hangchow, collected May 2, 1935, is probably an undescribed species of this genus. Y. L. Keng, December 26, 1939.

2. **Shibataea hispida** McClure (L.S.B. 9: 57). Shrub; fls. unknown; resembling *S. kumasasa*, the blades smaller, the margins more cartilaginous and more strongly spinulose. China; locally in An.

Shibataea chinensis Nakai (J.J.B. 9: 81, 85, pl. 1933) distinguished from *S. kumasasa* by blades glabrous beneath, has not been seen. Described from Kiangsu, near Sungkiang, type in Herb. Imp. Univ. Tokyo.—Agnes Chase.

Tribe II. **Festuceae** Fescue Tribe 狐茅族 (Hu Mao Ts'u)

Spikelets many-2-fld.; the florets perfect or the upper ones staminate or neuter, the rachilla disarticulating above the glumes and prolonged behind the palea; rarely the spikelets jointed with the pedicels and falling off with (or with a part of) them: *glumes* 2, rarely 3, usually *shorter than the first floret*; lemmas several-1-nerved, the *awns* when present terminal or *arising from between the lobes*, straight or rarely geni-

culate: habit various: infl. an open or contracted panicle, sometimes an open or spike-like raceme.

Key to the Genera

A. Lemma or rachilla with long silky hairs.
  Lemmas glabrous, awnless; rachilla segments not jointed, with hairs exceeding the lemma ..... 6. *Phragmites*
  Lemmas densely long-pilose on the margins, the apex with a recurved awn; rachilla in 2 segments, articulate. ..... 7. *Neyraudia*
AA. Lemma and rachilla glabrous, or if pubescent, the hairs short.
  B. Lemmas 3–1–nerved (5–3–nerved in *Cleistogenes*); the nerves usually prominent.
    C. Cleistogamous spikelets present within the sheaths: lemmas awned or mucronate ..... 8. *Cleistogenes*
    CC. Cleistogamous spikelets wanting: lemmas awnless. Lemmas subterete.
      Rachilla glabrous or sparsely pubescent ..... 9. *Molinia*
      Rachilla densely silky-pubescent ..... 10. *Moliniopsis*
    Lemmas compressed; rachilla glabrous ..... 11. *Eragrostis*
  BB. Lemmas several–5–nerved; the nerves sometimes obscure.
    D. Lf. blades broad, lanceolate or ovate, transversely veined ..... 12. *Lophatherum*
    DD. Lf. blades usually narrow, linear, not transversely veined.
      E. Spikelets in dense one-sided clusters on the ends of the few stiff branches of an open panicle ..... 19. *Dactylis*
      EE. Spikelets not crowded (except in *Puccinellia kengiana*), arranged in open or contracted panicles or racemes.
        F. Lemmas as broad as long; the margins outspread; florets closely imbricate, horizontally spreading ..... 20. *Briza*
        FF. Lemmas longer than broad; the margins clasping the palea; florets not horizontally spreading.
          G. Spikelets jointed with and falling off from the curve of the pedicels ..... 21. *Melica*
          GG. Spikelets not jointed with the pedicels, but disarticulating above the glumes.
            H. Nerves of the lemma parallel, not converging at the summit or but slightly so; lemmas awnless, mostly obtuse.
              Nerves prominent; styles distinct .. 13. *Glyceria*
              Nerves faint; styles none ..... 14. *Puccinellia*
            HH. Nerves of the lemma converging at the summit; lemmas awned or awnless.
              I. Spikelets awnless; the lemmas more or less cobwebby at the base.. 15. *Poa*
              II. Spikelets awned or awnless; the lemma never cobwebby at the base.

Leaf sheaths, at least the upper ones, open: ovary with terminal styles.
Infl. an open contracted or panicle: lemmas awned from the tip or awnless.. 16. *Festuca*
Infl. a single terminal spike-like raceme ..... 17. *Brachypodium*
Leaf sheaths closed: ovary with anteriorly placed styles (i. e. styles attached on the side facing the lemma); lemma awned from the bifid apex.. 18. *Bromus*

6. **Phragmites** Trin. Reed 蘆葦屬 (Lu Wei Shu)

Tall perennial reeds with lfy. culms: spikelets in large terminal panicles; the floret with *glabrous lemma* and long *silky rachilla*; 4 species in the north temperate zone; 2 in China. (Greek: *phragmites*, growing in hedges.)

1. **Phragmites communis** Trin. Common Reedgrass 蘆葦 (Lu Wei; Rushes) (G.M 131). Tall reed, 1–5 m. high; fls. IX; fr. X; hairs of rachilla exceeding the spikelet. North temperate regions; locally in An., Ku. Swampy Places. Fig. 405.

7. **Neyraudia** Hook. f. 類蘆屬 (Lui Lu Shu; Reed-like-grass Genus)

Stout rigid perennials with linear lf. blades: spikelets on slender branches in open panicles: *lemmas* with lateral nerves submarginal and long-*pilose*; rachilla disarticulating about the middle, forming a short *pubescent stipe*. 3 species in tropical Asia, Africa, and Madagascar; 2 in China. (Anagram of Reynaudia, after J. J. Reynaud, 1773–1842, French surgeon.)

Key to the Species

Sheaths marked with a line of hairs around the collar: spikelets 4–8–fld.; the lower floret empty ..... 1. *N. reynaudiana*
Sheaths without a line of hairs, around the collar: spikelets 3–6–fld.; the lower floret perfect ..... 2. *N. montana*

1. **Neyraudia reynaudiana** (Kunth) Keng (Hitch. 190). Robust grass, 1–3 m. high; fls. IX; fr. X. Southern and eastern Asia; locally in An., Ki. Grassy slopes.
2. **Neyraudia montana** Keng (Si. 6: 151, 156). Culms, to 1 m.; fls. VIII; fr. IX. Southern and eastern China; locally in An., Che., Ki. Mountain roadsides. Fig. 406.

8. **Cleistogenes** Keng 隱子草屬 (Yin Tzŭ Ts'ao Shu; Hidden-seed-grass Genus)

Perennials: *spikelets of two forms*; *one* in panicles of spike-like racemes; the other *hidden within the* upper *lf.-sheaths*: *lemmas awned or mucronate*. About 10 species, in southern Eurasia; 9 in China. (Greek: *kleistos*, shut, and *genes*, a suffix to signify development.)

Key to the Species

a. First lemma mucronate, or with an awn 1–3 mm. long.
Glumes acuminate; the second 4–6 mm. long, frequently 3–5–nerved

below ..... 1. *C. hancei*
Glumes acute or obtusish; the second 3–5 mm. long, 1- or 3-nerved below ..... 2. *C. serotina*
aa. First lemma usually with an awn 3–5 mm. long.
Spikelets 2–5-fld., 7–12 mm. long ..... 3. *C. nakaii*
Spikelets 1–3-fld., 5–7 mm. long ..... 4. *C. hackelii*

1. **Cleistogenes hancei** Keng (*Diplachne sinensis* Hance) (Si. 11: 408). Culms stout, 4–10 dm. high; fls. VIII; fr. IX. Northern and eastern China; locally in Ku. Hillsides.
2. **Cleistogenes serotina** (L.) Keng (Si. 5: 149). Culms 3–6 dm. high; fls. VIII; fr. IX. Southern and eastern Eurasia; locally in Ku. Moist slopes.
3. **Cleistogenes nakaii** (Keng) Honda (*Diplachne latifolia* Nakai) (Si. 5: 151). Culms stout, 4–10 dm. high; fls. VIII; fr. IX. Eastern Asia; locally in An., Ku. Prairies and shady thickets.
4. **Cleistogenes hackelii** (Honda) Honda (*Diplachne hackelii* Honda; *Diplachne serotina* Link var. *aristata* Hack.) 蘆草 (Chin Ts'ao) (Si. 5: 151). Culms 3–10 dm. high; fls. VIII; fr. IX. Central China and Japan; locally in Che., Ku. Moist ground.

9. **Molinia** Schrank 茂林草屬 (Mo Lin Ts'ao Shu)

A wiry hard-based tufted perennial with elongated basal lvs. clustered near the base of the apparently nodeless culms: leaf blades flat and narrow: infl. a panicle: spikelets 2–4-fld.: rachilla disarticulating above the glumes; *callus glabrous* or nearly so, glumes unequal, acute, shorter than the lemma, 1-nerved; *lemma* subterete, membranous, narrow, obtuse at apex, 3-nerved; palea equal to or exceeding the lemma. One species, in Eurasia. (Named for Giovanni Ignazio Molina, 1740–1829, student of Chilean flora.)

1. **Molinina caerulea** (L.) Moench (Hitch. 171). Culms 5–10 dm. high; rachilla glabrous. Eurasia; locally in Ku.

10. **Moliniopsis** Hayata 擬麥氏草屬 (Ni Mai Shih Ts'ao Shu; Molinia-like-grass Genus)

Moderately tall perennials with simple culms: spikelets in open panicles: *lemmas subterete, awnless*, the *silky-pubescent* rachilla segment disarticulating at the base, forming a short *callus* to the floret. 3 species, in eastern Asia; 2 in China. (A combination of *Molinia* and *opsis*, likeness.)

Key to the Species

Sheaths wooly at the thickened base of the culm: spikelets straw-colored; the first lemma 4–5 mm. long ..... 1. *M. hui*
Sheaths glabrous: spikelets purple; the first lemma 5.5–7 mm. long .... 2. *M. intermedia*

1. **Moliniopsis hui** (Pilger) Keng (*Molinia hui* Pilger) (Si. 11: 409). Culms 6–10 dm. high; fls. VIII; fr. IX. Southeastern China; locally in Che. Hillsides and thickets.
2. **Moliniopsis intermedia** Keng (Si. 11: 409). Culms 7–9 dm. high; fls. VIII; fr. IX. Southeastern China; locally in An. Open slopes.

11. **Eragrostis** Beauv. Lovegrass 画眉草屬 (Hua Mei Ts'ao Shu; Draw-eyebrow-grass Genus)

Perennial or annual grasses with tufted culms: spikelets in open or contracted

panicles: *lemmas awnless, compressed*, usually glabrous, 3-nerved or the lateral nerves obscure; *callus glabrous*. Over 100 species, in tropical and temperate regions; more than 20 in China. (Greek; *eros*, love, and *agrostis*, a grass.)

KEY TO THE SPECIES

a. Rachilla joints freely disarticulating, each with a floret; lemmas falling from above downwards ..... 7. *E. amabilis*
aa. Rachilla joints continuous or tardily disarticulating; the lemmas falling from below upwards.
b. Plants perennial.
Pedicels glandular in or above the middle ..... 1. *E. ferruginea*
Pedicels eglandular.
Spikelets tawny, green, or lead-colored; the lemmas rather firm, closely imbricate ..... 2. *E. elongata*
Spikelets purplish; the lemmas rather thin, loosely imbricate.. 3. *E. terrestris*
bb. Plants annual.
c. Lf. margins glandular: lemmas also frequently glandular on the keel ..... 6. *E. cilianensis*
cc. Lf. margins and keels of lemmas eglandular.
First glume 1–1.2 mm. long, 1-nerved; lateral nerves of the lemma distinct or prominent ..... 4. *E. autumnalis*
First glume 0.5–0.8 mm. long, often nerveless; lateral nerves of the lemma frequently obscure.
Panicle brs. long-pilose in the axils..... 5. *E. pilosa*
Panicle brs. glabrous in the axils ..... 5a. *E. pilosa* var. *imberbis*

1. **Eragrostis ferruginea** (Thunb.) Beauv. 知風草 (Chih Fêng Ts'ao; Indicate-the-wind Grass) (H.F. 7: 324). Culms 25–75 cm. high; fls. VIII; fr. IX. Eastern Asia; locally in An., Che., Ki., Ku. Waste places. Fig. 407.
2. **Eragrostis elongata** (Willd.) Jacq. (H.F. 7: 319). Culms 10–60 cm. high; fls. X; fr. XI. Southeastern Asia to Australia; locally in Che., Ki. Dry or moist ground.
3. **Eragrostis terrestris** Keng (Sc.C. 10: 182). Culms 30–60 cm. high; fls. IX; fr. X. Southeastern China; locally in An., Ku. Open moist ground.
4. **Eragrostis autumnalis** Keng (Sc.C. 10: 178). Culms 15–40 cm. high; fls. VIII; fr. IX. Southern, eastern and northern China; locally in An., Ku. Open roadsides.
5. **Eragrostis pilosa** (L.) Beauv. INDIA LOVEGRASS (Hitch. 151). Culms 15–60 cm. high; fls. and fr. VI–IX. Most warm countries; locally in Che., Ki., Ku. Waste ground or meadows.

5a. **Eragrostis pilosa** var. **imberbis** Franch. (NAMP 7: 145). Culms 10–30 cm. high; fls. VIII; fr. IX. Southeastern Asia; locally in An., Ku. Moist ground.

6. **Eragrostis cilianensis** (All.) Link ex Lutati STINKGRASS (Hitch. 155). Culms 15–90 cm. high; fls. and fr. V–X. Southern Eurasia, Africa, America; locally in Ku. Waste places.
7. **Eragrostis amabilis** (L.) Wight & Arn. (*E. tenella* (L.) Beauv.; *E. japonica* (Thunb.) Trin.) (Hitch. 147; M.E. 1: 88). Culms 30–100 cm. high; fls. and fr. VIII–X. Asia, America, Australia and Africa; locally in An., Che., Ki., Ku. Moist or low ground.

12. **Lophatherum** Brongn. 淡竹葉屬 (Tan Chu Yeh Shu)

Erect perennials with *lanceolate or ovate cross-veined lf. blades*: spikelets subsessile,

falling entire at maturity, in open panicles of few to several racemes: fertile lemmas mucronate, tightly rolled together. 2 species; one in tropical Asia and New Guinea; the other in southeastern China. (Greek: *lophis*, a crest, and *atheros*, awn or stiff bristle.)

Key to the Species

Spikelets lanceolate or linear-lanceolate, 1.5–2.0 mm. wide	1. *L. gracile*
Spikelets broadly lanceolate, 2.5–3.0 mm. wide	2. *L. sinense*

1. **Lophatherum gracile** Brongn. 淡竹葉 (Tan Chu Yeh; Light-green Bamboo Leaf) (H.F. 7:331). Rhizomes woody; roots often fleshy; culms 30–100 cm. high; fls. and fr. VIII–IX. Tropical Asia to New Guinea; locally in An., Che., Ki., Ku. Shady places. Fig. 408.
2. **Lophatherum sinense** Rendle (F.H.E. 3: 421). Differs from *L. gracile* only in the broader spikelets; fls. and fr. IX–X. Southeastern China; locally in An., Che., Ki., Ku.

13. **Glyceria** R. Br. 甜茅屬 (T'ien Mao Shu)

Aquatic or marshy-ground perennials with flat lf. blades, and closed or partly closed sheaths: spikelets awnless, in narrow or spreading panicles: lemmas with 7 *strong* parallel *nerves*, and with scarious margins and tips; styles distinct. About 40 species, in temperate regions; 8 in China. (Greek: *glykeros*, sweet, alluding to the taste of the grain.)

Key to the Species

Panicle ample, compound: palea equaling or shorter than the lemma	1. *G. leptolepis* var. *laxior*
Panicle much reduced, simple: palea longer than the lemma	2. *G. acutiflora*

1. **Glyceria leptolepis** Ohwi var. **laxior** Keng (Si. 11: 410). Culms about 1 m. high; fls. VI; fr. VIII. Southeastern China; locally in An., Ki. Stream banks.
2. **Glyceria acutiflora** Torr. 甜茅 (T'ien Mao; Sweet-grass) (Hitch. 83). Culms often decumbent, 30–60 cm. high; fls. IV; fr. VI. Eastern North America and eastern Asia; locally in Ku. Swamps and ditches.

14. **Puccinellia** Parl. 卜氏草屬 (Pu Shih Ts'ao Shu; Puccinelli's-grass Genus)

Low tufted annuals (ours): spikelets as in *Glyceria*: *lemmas with* 5 *obscure* parallel *nerves*; styles none. About 30 species, in arctic and sub-arctic regions; 8 in China. (After Prof. Benedetto Puccinelli, an Italian botanist.)

1. **Puccinellia kengiana** Ohwi (*P. stricta* Keng) (Si. 4: 321). Glabrous annual; culms 30–40 cm. high; fls. IV; fr. V. Southeastern China; locally in Ku. Ditches and wheat fields.

15. **Poa** Linn. 早熟禾屬 (Ts'ao Shu Ho Shu)

Perennials or annuals of various habit: lf. blades usually flat with navicular point: *spikelets* in panicles: lemmas *awnless*, usually scarious-tipped, 5-nerved, the mid-nerve and marginal nerves usually silky-pubescent; *callus* usually *cobwebby at the base.* About 200 species, in temperate and cold regions; about 30 species in China. (An ancient Greek name for grass or fodder.)

Key to the Species

a. Glumes and lemmas rather firm or chartaceous; 1st glume 1–3-nerved: lf. blades often involute or plicate.
  Culms and sheaths compressed-keeled: lemmas glabrous or sparsely cobwebby at the base ..... 1. *P. compressa*
  Culms and sheaths terete: lemmas copiously cobwebby at the base.
    Panicle brs. spikelet-bearing from near the base: spikelets 2–7-fld., 4–7 mm. long ..... 2. *P. sphondylodes*
    Panicle brs. naked in the lower half: spikelets 2–4-fld., 3–5 mm. long ..... 3. *P. faberi*
aa. Glumes and lemmas thin; 1st glume 1-nerved: lf. blades usually flat.
  Lemmas obtuse, broadly scarious above: panicle brs. smooth or nearly so; annual ..... 4. *P. annua*
  Lemmas acute or obtusish, narrowly scarious above: panicle brs. scaberulous.
    Spikelets 4–6-fld., 5–7 mm. long ..... 5. *P. mariesii*
    Spikelets 2–4 fld., 2–4 mm. long ..... 6. *P. acroleuca*

1. **Poa compressa** Linn. Canada Bluegrass (Hitch.106). Culms 30–60 cm. high. Eurasia; locally in Ki. Shady and moist places.
2. **Poa sphondylodes** Trin. (Mak.F.864). Culms 20–80 cm. high; fls. IV–V; fr. VI. Eastern Asia; locally in An., Che., Ku. Moist ground.
3. **Poa faberi** Rendle (F.H.E.3:423). Culms 45–70 cm. high; fls. V; fr. VI. Temperate China; locally in Ku. Moist open places.
4. **Poa annua** Linn. Low Speargrass 早熟禾 (Tsao Shu Ho; Early-maturing Grass) (Hitch.106). Culms 10–30 cm. high; fls. and fr. III–X. plant annual. Temperate regions; locally in Che., Ku. Meadows or moist ground.
5. **Poa mariesii** Rendle (F.H.E.3:425). Culms about 60 cm. high. Central China; locally in Ku. Moist places.
6. **Poa acroleuca** Steud. (Mak.F.864). Culms 30–60 cm. high; fls. IV; fr. V. Eastern Asia; locally in Che., Ki., Ku. Moist or shaded ground.

16. **Festuca** Linn. Fescue 狐茅属 (Hu Mao Shu; Fox-grass Genus)

Perennials or rarely annuals of various habit: spikelets in *panicles*: lemmas awned from the tip or awnless, 5-nerved; the nerves often obscure. About 100 species in temperate and cool regions; 12 in China. (An ancient Latin name for a grass.)

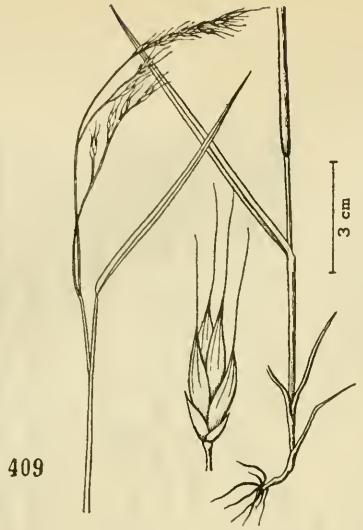
Key to the Species

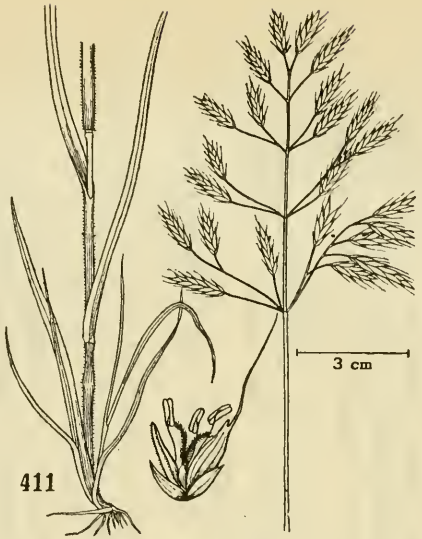
Perennial: stamens 3: awns capillary, 3–9 mm. long ..... 1. *F. parvigluma*
Annual: stamen 1: awns slender, up to 18 mm. long ..... 2. *F. myuros*

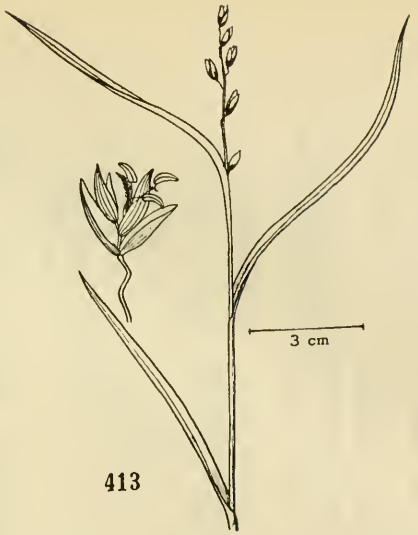
1. **Festuca parvigluma** Steud. (AMBL-B 2:282). Culms 30–60 cm. high; fls. IV; fr. V. Eastern Asia; locally in Che., Ku. Open or damp shady places. Fig. 409.
2. **Festuca myuros** Linn. (Hitch.63). Culms 30–40 cm. high; fls. V; fr. VII. Europe, Africa, North America, eastern Asia; locally in Ki. Mountainous roadsides.

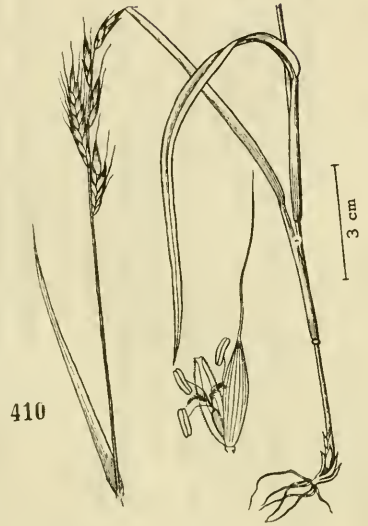
17. **Brachypodium** Beauv. 短柄草属 (Tuan Ping Ts'ao Shu)

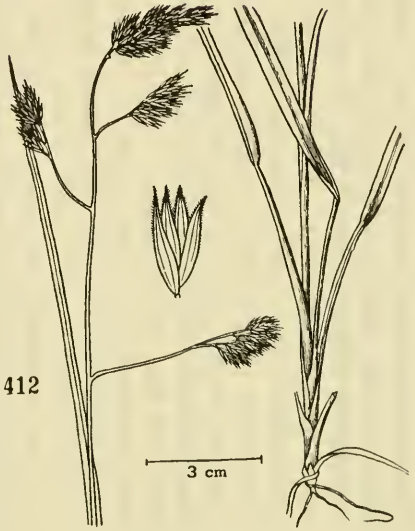
Tufted perennials: spikelets subsessile, in a *single terminal spike-like raceme*: lemmas 5–11-nerved, acuminate, with a terminal straight awn or mucro. About 10 species, in temperate regions and tropical mountains of the Old World; 5 in China.

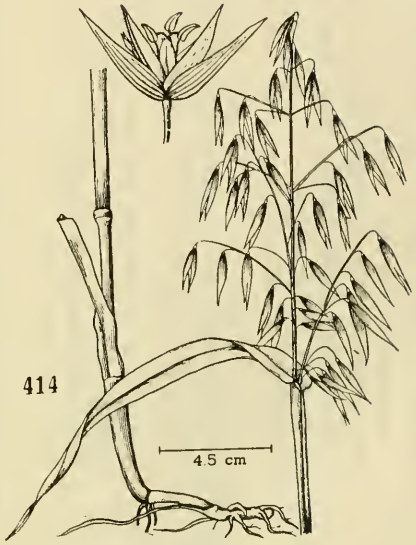












409. Festuca parvigluma
410. Brachypodium sylvaticum

411. Bromus japonicus
412. Dactylis glomerata

413. Melica grandiflora
414. Avena sativa

(Greek: *brachy-*, a prefix signifying short, and *podos*, a foot; referring to the short pedicels of the spikelets.)

1. **Brachypodium sylvaticum** (Huds.) Beauv. 短柄草 (Tuan Ping Ts'ao; Short-pedicelled Grass) (Hitch.57). Culms 40–80 cm. high; fls. VIII; fr. IX. Eurasia; locally in An., Ku. Shady woods or grassy slopes. Fig. 410.

18. **Bromus** Linn. Bromegrass 雀麥屬 (Ch'io Mai Shu)

Perennials or annuals with *closed sheaths*: spikelets rather large, in open panicles: lemmas 5–9-nerved, awned from the tip or from a short distance below the retuse or 2-*toothed apex*; ovary hirsute at apex with *anteriorly placed styles*. About 100 species, in temperate regions; more than 10 in China. (Greek: *broma*, food, an ancient name for the oat.)

Key to the Species

Perennial: awns terminal or nearly so ..... 1. *B. remotiflorus*
Annual: awns arising from below or between the 2-toothed apex of the lemma.
Stamens 3: awns scaberulous, 5–14 mm. long ..... 2. *B. japonicus*
Stamens 2: awns scabrous, 4–6 cm. long ..... 3. *B. rigidus*

1. **Bromus remotiflorus** (Steud.) Ohwi (*Schoenodorus remotiflorus* (Steud.) Miq.) (AMBL-B 2:283). Culms 60–120 cm. high; fls. VI; fr. VII; perennial. Eastern Asia; locally in Che., Ki., Ku. Shady woods or ravines.
2. **Bromus japonicus** Thunb. 雀麥 (Ch'io Mai; Bird's Wheat) (Hitch.51). Culms 30 cm. to 1 m.; fls. IV; fr. VII. Eurasia; locally in An., Che., Ku. Slopes and roadsides. Fig. 411.
3. **Bromus rigidus** Roth (Hitch.52). Culms 30–40 cm. high; fls. VI; fr. VII. Introduced in southeastern China; locally in Ki. Streambanks.

19. **Dactylis** Linn. Orchard Grass 鴨茅屬 (Ya Mao Shu; Duck-grass Genus)

Tufted perennials: spikelets subsessile, crowded in 1-sided fascicles at the ends of panicle brs.: lemmas 5-nerved, mucronate. A few species in temperate Eurasia and North Africa; one in China. (Greek: *dactylos*, a finger; a name used by Pliny for a grass with digitate spikes.)

1. **Dactylis glomerata** Linn. var. **altaica** (Bess.) Keng (Si.11:410). Culms 60–120 cm. high; fls. VI; fr. VII; spikelets oblong; florets relatively distant. Eurasia; locally in Ki. Mountainous roadsides. Fig. 412.

20. **Briza** Linn. Quaking Grass 凌風草屬 (Ling Fêng Ts'ao Shu; Wind-driven-grass Genus)

Annuals or perennials with flat lvs. and showy open panicles: spikelets broad, glabrous, pendulous, often heart-shaped; the upper florets usually imperfect; glumes with broad scarious margins; lemmas papery, broad; palea much shorter than its lemma. 3 species, temperate Old World and South America; one in China. (Greek: *brizein*, nodding.)

1. **Briza minor** Linn. (Hitch.139). Glabrous; culms 15–25 cm. high; fls. V; frs. VI;

lemmas as broad as long. Eurasia; locally in Ku. Moist meadows.

21. **Melica** Linn. 臭草属 (Ch'ou Ts'ao Shu; Stinking-grass Genus)

Perennials with closed sheaths: *spikelets* on slender pedicels which are curved and pubescent near the apex, *disarticulating from the curve of the pedicel*: lemmas several-nerved, awnless. About 70 species, in cool regions; 6 in China. (An old Italian name for Sorghum; from *mel*, honey.)

Key to the Species

Panicle 15–30 cm. long, compound: spikelets 4–6 mm. long; the imperfect florets not forming a club-shaped or globular mass..... 1. *M. onoei*
Panicle 3–10 cm. long, simple or reduced to a raceme: spikelets 7–10 mm. long; the imperfect florets forming a club-shaped or globular mass.. 2. *M. grandiflora*

1. **Melica onoei** Franch. & Sav. (Mak.F.862). Culms 75–150 cm. high; fls. VIII; fr. IX. Eastern Asia; locally in Che., Ku. Open thickets.
2. **Melica grandiflora** Koidz. (Bo.Ma.T.39:17). Culms 30–60 cm. high; fls. IV; fr. V. Eastern Asia; locally in Che., Ku. Shady woods and moist ground. Fig. 413.

Tribe III. **Aveneae** Oat Tribe 燕麦族 (Yen Mai Ts'u)

Spikelets several-2-fld., the rachilla disarticulating above the glumes (except in *Holcus*) and prolonged behind the upper palea: glumes equaling or longer than the first floret, or even as long as the whole spikelet; lemmas several-5-nerved, indurate at maturity, dorsally rounded; awns when present arising from the back or from between the teeth of a bifid apex: infl. a panicle or a raceme.

Key to the Genera

A. Spikelets disarticulating below the glumes ..... 25. *Holcus*
AA. Spikelets disarticulating above the glumes.
Lemmas awnless or mucronate ..... 22. *Koeleria*
Lemmas distinctly awned.
Spikelets less than 1 cm. long: glumes 1–3-nerved ..... 23. *Trisetum*
Spikelets over 1 cm. long: glumes several-nerved..... 24. *Avena*

22. **Koeleria** Pers. 菪草属 (Hsia Ts'ao Shu)

Tufted perennials with spike-like panicles: spikelets sub sessile or shortly pedicelled: *lemmas* faintly 3–5-nerved, *acute or mucronate*. About 20 species, in temperate regions; 3 in China. (After Professor G. L. Koeler, an early German writer on the grasses.)

1. **Koeleria cristata** (L.) Pers. 菪草 (Hsia Ts'ao) (Hitch.281). Culms 15–60 cm. high; fls. IV; fr. V; lemmas awnless. North temperate zone; locally in Che., Ku. Grassy slopes.

23. **Trisetum** Pers. 蟹鉤草属 (Hsieh Kou Ts'ao Shu; Crab-claw-grass Genus)

Tufted perennials: spikelets less than 1 cm. long, 2–3-fld.: lemmas chartaceous, with hyaline margins, 2-toothed, dorsally awned above the middle; *glumes* 1–3-*nerved*. About 65 species, in arctic and temperate zones; 6 in China. (Latin: *tres*, three, and *seta*, a bristle.)

Key to the Species

Culms 90–150 cm. tall, 7–10-noded: lower lemma 5.0–6.5 mm.; awn 4–6 mm. long ..... 1. *T. henryi*
Culms 45–90 cm. tall, 2–3-noded: lower lemma 6.5–8.0 mm.; awn 7–9 mm. long ..... 2. *T. macranthum*

1. **Trisetum henryi** Rendle (F.H.E.3:400). Culms 90–150 cm. high, with 7–10 nodes. Central China; locally in An., Che., Ki. Open meadows and moist shade.
2. **Trisetum macranthum** (Hack.) Keng (*T. flavescens* var. *macranthum* Hack.) (Si. 11:411). Culms 45–90 cm. high; fls. V; fr. VI; culms with 2–3 nodes. Eastern Asia; locally in Che., Ku. Moist woods, bamboo groves.

24. **Avena** Linn. Oat 燕麥屬 (Yen Mai Shu)

Annuals (ours) with open panicles: *spikelets over 1 cm. long*, 2–3-fld., drooping: lemmas indurate with membranous apex, 3–7-nerved, dorsally awned or awnless; *glumes several-nerved*. Over 50 species, in the temperate zone; 10 in China. (The classical Latin name.)

Key to the Species

a. Spikelets mostly 2-fld.: florets not readily separating; awn usually straight or wanting; lemmas glabrous ..... 1. *A. sativa*
aa. Spikelets mostly 3-fld.: florets readily separating; awn stout, geniculate, twisted.
Lemmas sparsely villous to beyond the middle ..... 2. *A. fatua*
Lemmas dorsally glabrous.
Rachilla stouter, stiffly villous ..... 2a. *A. fatua* var. *glabrata*
Rachilla slender, softly pubescent or nearly glabrous.. 2b. *A. fatua* var. *mollis*

1. **Avena sativa** Linn. Oat (Hitch.300). Culms 30–75 cm. high. Eurasia; locally in Ku. Waste places. Fig. 414.
2. **Avena fatua** Linn. Wild Oat 燕麥 (Yen Mai; Swallow's Wheat) (Hitch.300). Culms 30–75 cm. high; fls. IV; fr. V. Eurasia, northern Africa; locally in Che., Ku. Roadsides and field margins.

2a. **Avena fatua** Linn. var. **glabrata** Peterm. (Peterm.13). Habit and habitat as in *A. fatua*.

2b. **Avena fatua** Linn. var. **mollis** Keng (Si.11:411). Culms 75–100 cm.; fls. IV; fr. V. China; locally in Ku. Waste ground.

25. **Holcus** Linn. 絨毛草屬 (Jung Mao Ts'ao Shu; Velvet-grass Genus)

Perennials velvety throughout, with contracted panicles: *spikelets* 2-fld., *disarticulating below the glumes*: lower lemma awnless; the upper bearing on the back a short awn. About 8 species, in Europe and Africa; one in China. (Ancient Latin name for a kind of grain.)

Key to the Species

Rhizomes wanting ..... 1. *H. lanatus*
Rhizomes present ..... 2. *H. mollis*

1. **Holcus lanatus** Linn. Velvet Grass (Hitch.305). Culms 30–60 cm. high; fls. VI; fr. VIII. Introduced from Europe; locally in Ki. Open damp ground.

2. **Holcus mollis** Linn. (Hitch.305). Culms 50–100 cm. high. Introduced from Europe; locally in Ki. Damp ground.

Tribe IV. **Chlorideae** 虎尾草族 (Hu Wei Ts'ao Ts'u)

Spikelets several-1-fld., subsessile, in 2 rows on one side of a continuous rachis: rachilla disarticulating above the glumes (except in *Beckmannia*) and prolonged behind the palea; glumes 2, equaling or shorter than the first floret; lemmas 5–3–1-nerved; awns, when present, straight or divergent, arising from between the teeth of a bifid apex; infl. of many to few secund spike-like racemes, in panicles, racemes, or digitate along the common axis.

Key to the Genera

A. Spikelets with several to 2 perfect florets.
  Spikes numerous, slender, racemose on an elongated axis ..... 26. *Leptochloa*
  Spikes several to few, stout, digitate on a shortened axis ..... 27. *Eleusine*
AA. Spikelets with 1 (rarely 2) perfect floret.
  Spikelets disarticulating above the glumes.
    Lemmas distinctly awned ..... 28. *Chloris*
    Lemmas awnless ..... 29. *Cynodon*
  Spikelets disarticulating below the glumes ..... 30. *Beckmannia*

26. **Leptochloa** Beauv. 畔茅属 (Pan Mao Shu; Field-margin-grass Genus)

Tufted annuals (ours) with *numerous* slender *spikes* or spike-like racemes forming *an elongate simple panicle*: spikelets 2–several-fld., subsessile in 2 rows along one side of a slender rachis: lemmas 1–3-nerved, obtuse or acute. About 30 species, in warm regions; 3 in China. (Greek: *leptos*, slender, and *chloa*, grass, alluding to the slender spikes.)

Key to the Species

Sheaths glabrous: spikelets 3–7-fld., 2.2–4.0 mm. long ..... 1. *L. tenerrima*
Sheaths papillose-pilose: spikelets 2–4-fld., 1.0–2.2 mm. long ..... 2. *L. chinensis*

1. **Leptochloa tenerrima** (Hornem.) Roem. & Schult. (R. & S.2:581). Culms 30–90 cm. high; fls. IX; fr. X. Warm regions of the Old World; locally in Che., Ki., Ku. Moist fields and ditches.
2. **Leptochloa chinensis** (L.) Nees (M.F.105). Culms 30–60 cm. high; fls. VII; fr. IX. Tropical and subtropical regions; locally in Ku. Fields, gardens.

27. **Eleusine** Gaertn. Yard Grass 蟋蟀草属 (Hsi So Ts'ao Shu; Cricket-grass Genus)

Tufted annuals with compressed culms and 2–many *stout digitate* or approximate *spikes*: spikelets sessile, closely imbricate, in 2 rows along one side of a continuous rachis: lemmas acute, awnless, 3–5-nerved; the intermediate nerves, when present, close to the middle one and forming the keel: pericarp loosely enclosing the seed; seed marked with comb like lines. About 10 species, mostly Indian and African; 2 in China. (Greek: *Eleusin*, the town where Ceres, the goddess of harvests, was worshipped.)

Key to the Species

Culms stout or slender: spikes rather thin, straight: seeds oblong ..... 1. *E. indica*

Culms rather robust: spikes very thick and finally incurved: seeds globose ..... 2. *E. coracana*

1. **Eleusine indica** (L.) Gaertn. Goosegrass 牛筋草 (Niu Chin Ts'ao Cow-sinew Grass) (Hitch. 499). Culms 15–90 cm. high; fls. VII; fr. X. Tropical and temperate zones; locally in An., Che., Ku. Roadsides, waste ground. Fig. 415.
2. **Eleusine coracana** (L.) Gaertn. Finger Millet (Hitch. 501). Culms 60–120 cm. high; fls. VIII; fr. IX. Tropical regions; locally in An., Che., Ki. Cultivated.

28. **Chloris** Sw. Fingergrass 虎尾草属 (Hu Wei Ts'ao Shu; Tiger-tail-grass Genus)

Tufted annuals (ours) with few to several digitate spikes: *spikelets with one perfect floret*, sessile, imbricate, in 2 rows along one side of a slender rachis, *disarticulating above the glumes*: lemmas 1–3-nerved, the mid-nerve or keel extending into a slender straight *awn*, the marginal nerves long-ciliate. About 50 species, chiefly American; 3 in China. (Named for *Chloris*, the Greek goddess of flowers.)

1. **Chloris virgata** Sw. Feather Fingergrass (Hitch. 527). Culms 15–60 cm. high; fls. VIII; fr. IX; spikelets 2-awned. Temperate and tropical zones; locally in Ku. Open grassland. Fig. 416.

29. **Cynodon** Rich. 狗牙根属 (Kou Ya Kên Shu)

Stoloniferous perennials with few to several digitate spikes: spikelets 1–2-fld., sessile, imbricate in 2 rows along one side of a slender rachis, *spikelets disarticulating above the glumes*: *lemmas* strongly compressed, with pubescent keel, 3-nerved, *awnless*: the lateral nerves submarginal. About 10 species, mostly tropical; 2 in China. (Greek: *kuon*, a dog and *odous*, a tooth, alluding to the sharp hard scales of the rhizome.)

1. **Cynodon dactylon** (L.) Pers. Bermuda Grass 狗牙根 (Kou Ya Kên; Dog-tooth Root) (Hitch.503). Culms 10–30 cm. high; fls. and fr. V–X. Eurasia; locally in Ku. Meadows and roadsides. Fig. 417.

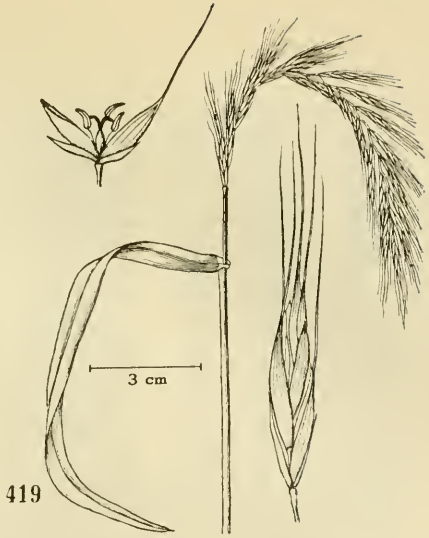
30. **Beckmannia** Host Sloughgrass 水稗属 (Shui Pai Shu)

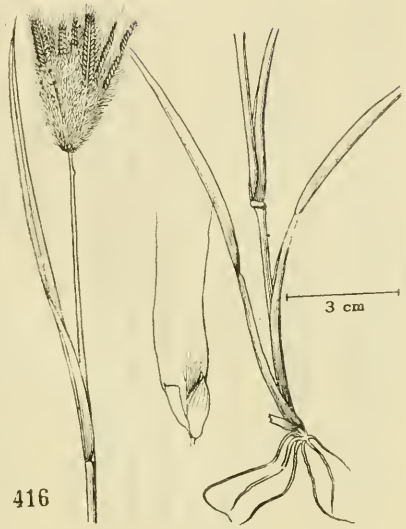
Erect annuals with flat blades and numerous short spikes in a narrow more or less interrupted panicle: *spikelets* 1–2-fld., nearly sessile and closely imbricate along one side of a slender rachis, *disarticulating below the glumes*: glumes inflated, cymbiform, 3-nerved, enclosing a lanceolate 5-nerved lemma. Two species in the north temperate zone. (After Johann Beckmann, 1739–1811, professor of botany at Goettingen.)

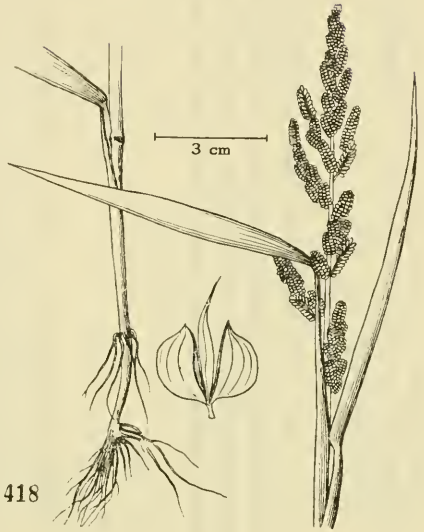
1. **Beckmannia syzigachne** (Steud. Fernald (*B. erucaeformis* (L.) Host. var. *uniflora* Scribn.) (Hitch.508, 826). Culms 30–100 cm. tall; fls. IV; fr. IV; spikelets 1-fld. Asia and North America; locally in Che., Ku. Marshy places. Fig. 418.

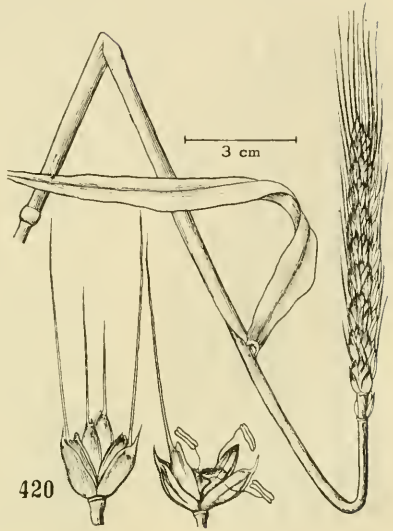
Tribe V. **Hordeae** Barley Tribe 大麦族 (Ta Mai Ts'u)

Spikelets several–1-fld., sessile, 1–2 or more at each node on opposite sides of the rachis: rachilla disarticulating above the glumes and prolonged behind the upper palea into a naked or glumiferous bristle; glumes 2 (reduced or obsolete in Hystrix), opposite









415. Eleusine indica
416. Chloris virgata

417. Cynodon dactylon
418. Beckmannia syzigachne

419. Agropyron semicostatum
420. Triticum aestivum

or subcollateral; lemmas several–3–nerved, the awns when present terminal, straight or divergent: perennials or annuals with auricled blades and terminal spikes.

Key to the Genera

A. Spikelets solitary at each node of the rachis.
  Spikelets placed edgewise to the rachis; first (inner) glume wanting (except in the terminal spikelet) ..... 33. *Lolium*
  Spikelets placed sidewise to the rachis; both glumes present.
    Lemma with a distinct callus; grain usually adherent to the lemma and palea ..... 31. *Agropyron*
    Lemma without callus; grain free ..... 32. *Triticum*
AA. Spikelets 1 to 3 at each node of the rachis.
  Spikelets 3–nate; glumes linear or setaceous ..... 34. *Hordeum*
  Spikelets 2–nate; glumes reduced or obsolete ..... 35. *Hystrix*

31. **Agropyron** Gaertn. Wheatgrass 鵝觀草属 (O Kuan Ts'ao Shu; Goose-like-grass Genus)

Perennials with simple culms and terminal spikes: spikelets placed sidewise to the rachis, several-fld., usually solitary at each node of the rachis: glumes subequal, usually shorter than the first floret; *lemmas* firm. 5–nerved, awned from the tip or rarely awnless, *with a distinct callus*; *grain usually adherent to the lemma and palea*. About 60 species, mostly in the temperate zone; 10 in China. (Greek: *agros*, wild, and *puros*, wheat.)

Key to the Species

a. Margins of the lemma more or less scarious, neither ciliate nor scaberulous.
  Spikes usually drooping: awns slender, flexuous.
    Culms slender, 30–75 cm. tall: spikes 7–15 cm. long: spikelets 4–7–fld., 13–20 mm. long ..... 1. *A. semicostatum*
    Culms rather stout, 75–150 cm. tall: spikes 15–25 cm. long: spikelets 5–15–fld., 15–25 mm. long ..... 1a. *A. semicostatum* var. *transiens*
  Spikes usually erect: awns rigid, straight ..... 2. *A. mayebaranum*
aa. Margins of the lemma not scarious, usually ciliolate or scaberulous.
  b. Lemmas entire; keels of palea only scaberulous at apex: grains glabrous. ..... 3. *A. integrum*
  bb. Lemmas mostly minutely 2–lobed; keels of paleae rigidly ciliolate or scaberulous above: grains pubescent at apex.
    c. Lemmas distinctly awned; awns 5–20 mm. long.
      Culms 30–120 cm. tall: blades 3–10 mm. wide ..... 4. *A. ciliare*
      Culms 20–25 cm. tall: blades 1–2 mm. wide ..... 4a. *A. ciliare* var. *pauperum*
    cc. Lemmas nearly awnless or with an awn 1–3 mm. long.... 4b. *A. ciliare* var. *submuticum*

1. **Agropyron semicostatum** (Steud.) Nees (Hitch. 242). Culms 30–75 cm. high; fls. IV; fr. VI. India and China; locally in An., Che., Ki., Ku. Shady and moist ground. Fig. 419.

1a. **Agropyron semicostatum** var. **transiens** Hack. Culms 75–150 cm. high; fls. IV; fr. VI. Eastern Asia; locally in Che., Ki., Ku. Waste ground and grassy slopes.

2. **Agropyron mayebaranum** Honda (Bo.Ma.T.41:384). Culms 60–90 cm. high; fls. V; fr. VII. Eastern Asia; locally in Ku. Wet places and grassy hills.
3. **Agropyron integrum** (Keng) Keng (*A. ciliare* (Trin.) Franch. var. *integrum* Keng) (CBLS 10:186). Culms 75 cm. high; fls. V; fr. VIII. Southeastern China; locally in Ku. Roadside thickets.
4. **Agropyron ciliare** (Trin.) Franch. (Mak.F.871). Culms 30–120 cm. high; fls. V; fr. VII. Eastern Asia; locally in An., Che., Ku. Waste roadsides and grassy slopes.

4a. **Agropyron ciliare** var. **pauperum** Keng (CBLS 10:187). Culms 20–25 cm. high; fls. VII; fr. VIII. Southeastern China; locally in Ku. Moist grassland.

4b. **Agropyron ciliare** var. **submuticum** Honda (To.J.Sc.Bo.3:27). Culms 30–120 cm. high; fls. V; fr. VII. Eastern Asia; locally in Ku. Slopes and moist ground.

There exists in our area great variation in the degree of hairiness, or lack of it, on the lemmas of *A. ciliare*, so that distinct entities based on this character are very difficult to define.

32. **Triticum** Linn. Wheat 小麥属 (Hsiao Mai Shu)

Annuals with simple culms and thick terminal spikes: *spikelets placed sidewise to the rachis*, 3–5-fld., solitary at each node of the rachis: glumes rigid, 3–several-nerved; *lemmas* broad, keeled above, *without callus*, 5–9-nerved, abruptly pointed or awned: *grain free*. About 10 species, in southern Europe and western Asia. (The ancient Latin name for wheat.)

1. **Triticum aestivum** Linn. Wheat 小麥 (Hsiao Mai; Small Wheat) (Hitch.243). Culms 60–120 cm. high; fls. IV; fr. V; grain free. Widely cultivated; locally in An., Che., Hon., Hun., Hup., Ki., Ku. Cultivated fields. Fig. 420.

33. **Lolium** Linn. Ryegrass 毒麥属 (Tu Mai Shu; Poisonous-wheat Genus)

Perennials with slender usually flat terminal spikes: *spikelets solitary, placed edgewise* in alternate notches of a continuous rachis: *glume* 1, *the first wanting* (except on the terminal spikelet), the second outward, strongly 3–5-nerved, equaling or exceeding the first floret; lemmas convex, 5–7-nerved, awnless or awned. About 8 species, in the Old World; 2 introduced in China. (The ancient Latin name for darnel.)

Key to the Species

Spikelets 10–20-fld.: lemmas awned; annual	1. *L. mutiflorum*
Spikelets 6–10-fld.: lemmas awnless; perennial	2. *L. perenne*

1. **Lolium multiflorum** Lam. Italian Ryegrass (Hitch.275). Culms 30–75 cm. high; fls. VI; fr. VII. Introduced from Europe; locally in Ku. Fields and roadsides.
2. **Lolium perenne** Linn. Perennial Ryegrass (Hitch.275). Culms 30–60 cm. high; fls. VI; fr. VII. Introduced from Europe; locally in Ku. Fields and roadsides.

34. **Hordeum** Linn. Barley 大麥属 (Ta Mai Shu)

Annuals (ours) with terminal spikes: *spikelets* 1-fld., 3-*nate* at each node, the floret dorsiventral to the rachis: *glumes narrow, subulate or setaceous*, standing in front of the spikelet; lemma rounded on the back, obscurely 5-nerved, tapering to a long awn or awnless. About 20 species, in temperate zone; 3 in China. (The ancient Latin name for barley.)

Key to the Species

Lemma long-awned, or awnless without appendage ..... 1. *H. vulgare*
Lemma awnless with a dilated 3-fid appendage ..... 1a. *H. vulgare* var. *trifurcatum*

1. **Hordeum vulgare** Linn. Barley 大麥 (Ta Mai; Large Wheat) (Hitch.274). Culms 50–100 cm. high; fls. IV; fr. V. Widely cultivated; locally in An., Che., Hon., Hun., Hup., Ki., Ku. Cultivated fields. Fig. 421.

1a. **Hordeum vulgare** var. **trifurcatum** (Schlecht.) Alef. Beardless Barley (Hitch. 274). Culms 90 cm. high; fls. IV; fr. V. Introduced from Himalaya region; occasionally in Ku. Cultivated fields.

35. **Hystrix** Moench 蝟草屬 (Wei Ts'ao Shu; Hedgehog-grass Genus)

Perennials with loosely fld. terminal spikes: *spikelets* 1–2-fld. (ours), 1–2-*nate* at each node, the floret dorsiventral to the rachis: *glumes* 2, *reduced to minute bristles*, lemmas convex, rigid, 5-nerved above, tapering into long awns. About 7 species, in eastern Asia and North America; 1 in China. (Greek: *hustrix*, a hedgehog, alluding to the bristly spikes.)

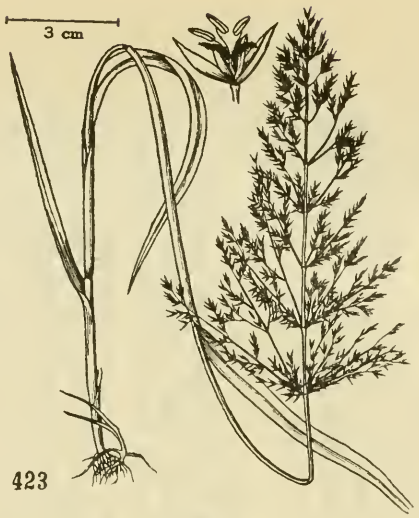
1. **Hystrix duthiei** (Stapf) Bor (*Asperella duthiei* Stapf) (H.F.7:375). Culms 60–120 cm. high; fls. V; fr. VI. Western Himalaya to Japan; locally in Che. Shady woods and waste roadsides.

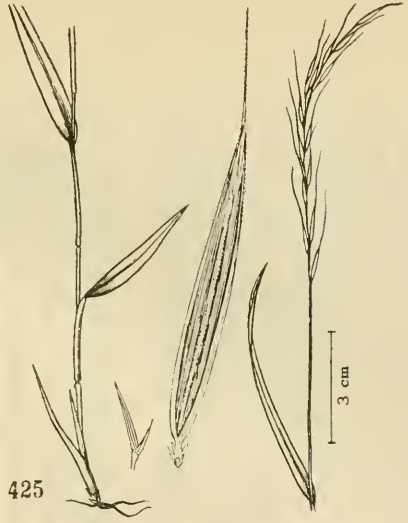
Tribe VI. **Agrostideae** Bentgrass Tribe 剪股穎族 (Chien Ku Ying Ts'u)

Spikelets 1-fld., perfect, disarticulating above or below the glumes, sometimes (as n *Polypogon*) jointed with the pedicels and falling off with a part of the latter: glumes 2, longer or shorter than the floret; lemmas 5–3–1-nerved, membranaceous or thinner but often indurate at maturity; awns when present straight or geniculate, arising from the tip, from the back, or from between the teeth of a bifid apex; paleae usually 2-keeled, sometimes minute or wanting: infl. an open, contracted or spike-like panicle.

Key to the Genera

A. Spikelets disarticulating (or the pedicels jointed) below the glumes.
  B. Spikelets laterally compressed.
    Pedicels not jointed; glumes awnless ..... 46. *Alopecurus*
    Pedicels jointed; glumes awned ..... 47. *Polypogon*
  BB. Spikelets dorsally compressed.
    Perennial: blades linear-lanceolate ..... 48. *Phaenosperma*
    Annual; blades ovate-cordate..... 49. *Sphaerocaryum*
AA. Spikelets disarticulating above the glumes.
  C. Glumes shorter than the floret.
    Lemma terminating in a slender awn: fr. a caryopsis.
      Rachilla prolonged behind the palea; lemma 5-nerved .. 40. *Brachyelytrum*
      Rachilla not prolonged behind the palea; lemma 3-nerved 41. *Muhlenbergia*
    Lemma awnless: fr. a utricle ..... 42. *Sporobolus*
  CC. Glumes longer than the floret.
    D. Lemma indurate or firmer than the glumes.
      Lemma awnless, without distinct callus ..... 43. *Milium*
      Lemma awned, with pointed or obtuse callus.
        Awn simple; a line of demarcation between the awn and lemma..... 45. *Stipa*





421. Hordeum vulgare
422. Calamagrostis epigejos

423. Agrostis stolonifera
424. Phleum pratense

425. Brachyelytrum japonicum
426. Muhlenbergia japonica

Awn 3-divided; no line of demarcation between the awn and lemma ..... 44. *Aristida*

DD. Lemma membranaceous or thinner than the glumes.

E. Rachilla prolonged behind the palea into a minute plumose bristle ..... 36. *Deyeuxia*

EE. Rachilla not prolonged behind the palea.

Panicle open or contracted: glumes not keeled, acute or acuminate.

Lemma long-villous at the base ..... 37. *Calamagrostis*

Lemma glabrous or puberulent at the base .... 38. *Agrostis*

Panicle dense, cylindrical: glumes compressed-keeled, abruptly awned or mucronate ..... 39. *Phleum*

36. **Deyeuxia** Clarion 杜氏草属 (Tu Shih Ts'ao Shu; Deyeux's-grass Genus)

Perennials with open or contracted panicles: spikelets 1-fld., the *rachilla prolonged behind the palea into a minute plumose bristle*: glumes 1-3-nerved, acute or acuminate; lemmas 3-5-nerved, the mid-nerve usually deviating from near the base or above the middle into an awn. Over 100 species, in temperate zone; 20 in China. (After Nicolas Deyeux, 1753-1837, a French chemist and apothecary.)

Key to the Species

Awn 2-4 mm. long, straight; callus hairs about 3/4 as long as the lemma ..... 3. *D. hakonensis*

Awn 6-9 mm. long, geniculate; callus hairs 1/4-1/3 as long as the lemma.

Spikelets creamy or purplish, in a loose panicle ..... 1. *D. hupehensis*

Spikelets pale green or straw-colored, in a dense panicle ..... 2. *D. sylvatica* var. *collina*

1. **Deyeuxia hupehensis** Rendle (F.H.E.3:394). Culms 60-120 cm. high; fls. IX; fr. X. Temperate Asia; locally in An., Che., Ki., Ku. Woody slopes and grassland.
2. **Deyeuxia sylvatica** (Schrad.) Kunth var. **collina** (Franch.) Rendle (F.H.E.3:396). Culms 90 cm. high; fls. VII; fr. VIII. China; locally in An., Ki. Exposed slopes.
3. **Deyeuxia hakonensis** (Franch. & Savat.) Keng (*Calamagrostis hakonensis* Franch. & Savat.) (Si.11:411). Culms 30-60 cm. high; fls. VI; fr. VII. Eastern Asia; locally in An., Che. Shady woods.

37. **Calamagrostis** Adans. Reedgrass 拂子茅属 (Fu Tzŭ Mao Shu; Broom-grass Genus)

Stout perennials with dense contracted panicles (ours): *spikelets* 1-fld., *without prolonged rachilla*: glumes linear; lemma hyaline, denticulate or 2-cleft, dorsally awned below the tip or near the middle; *callus hairs dense*, longer than the lemma. About 15 species, in temperate zone of Old World; 3 in China. (Greek: *kalamos*, a reed, and *agrostis*, a grass.)

1. **Calamagrostis epigejos** (L.) Roth (Hitch.328). Culms 50-150 cm. high, and with long vigorous rhizomes; fls. VI; fr. VIII. Eurasia; locally in An., Che., Ki., Ku. Ravines and swampy places. Fig. 422.

38. **Agrostis** Linn. Bentgrass 剪股颖属 (Chien Ku Ying Shu; Scissors-like Genus)

Usually perennials with open or contracted panicles: *spikelets* 1-fld., without

prolonged rachilla: glumes subequal, 1-nerved; *lemma* shorter and thinner than the glumes, *glabrous or puberulent at the base*, faintly 5-nerved, awnless or dorsally awned. About 100 species, in north temperate zone; 30 in China. (Greek: *agrostis*, a kind of grass, from *agros*, a field.)

Key to the Species

a. Palea evident, over 2/3 as long as the lemma.
  Panicle loose: lemma awnless.
    Panicle 5–15 cm. long, upright, the brs. usually stouter, ascending — 1. *A. stolonifera*
    Panicle 8–22 cm. long, drooping, the brs. usually capillary, spreading — 1a. *A. stolonifera* var. *gigantea*
  Panicle rather dense: lemma frequently awned below the middle — 1b. *A. stolonifera* var. *aristata*

aa. Palea minute, not over 1/3 as long as the lemma.
  Panicle open: spikelets 2.0–2.5 mm. long, awned — 2. *A. canina* var. *formosana*
  Panicle contracted: spikelets 1.5–2.0 mm. long, awnless — 3. *A. matsumurae*

1. **Agrostis stolonifera** Linn. (Hitch.338). Culms 25–60 cm. high; fls. VII; fr. VIII. North temperate zone; locally in Ki. Open moist ground. Fig. 423.

1a. **Agrostis stolonifera** var. **gigantea** (Roth) Klett & Richt. Culms 50–100 cm. high; fls. VII; fr. VIII. Temperate Eurasia; locally in Ki. Damp places and shady ground.

1b. **Agrostis stolonifera** var. **aristata** Sincl. Culms 60–100 cm. high; fls. VII; fr. VIII. Temperate Eurasia; locally in Ki. Open moist roadsides.

2. **Agrostis canina** Linn. var. **formosana** Hack. Culms 30–90 cm. high; fls. IV; fr. V. Eastern Asia; locally in An., Che., Ki., Ku. Open moist ground and shady woods.

3. **Agrostis matsumurae** Hack. (Mak.F.849). Culms 20–40 cm. high; fls. IV; fr. V. Eastern Asia; locally in Che., Ki., Ku. Open places and moist ground.

39. **Phleum** Linn. Timothy 大粟草属 (Ta Shu Ts'ao Shu; Large Millet-grass Genus)

Perennials or annuals with *dense cylindrical* spike-like *panicles*: spikelets subsessile, strongly laterally compressed, *without prolonged rachilla*: *glumes* equal, indurate, *abruptly awned or mucronate*; lemma thin, 3–5-nerved, awnless, much smaller than the glumes. About ten species, in the temperate zone; 3 in China. (Greek: *phleos*, a kind of reed.)

Key to the Species

Perennial: spikelets oblong; awn of glumes 1 mm. long; anthers 1.5 mm. long — 1. *P. pratense*
Annual: spikelets cuneate-obovate; awn of glumes 0.5 mm. long; anthers 0.5 mm. long — 2. *P. paniculatum*

1. **Phleum pratense** Linn. Timothy (Hitch.367). Culms 30–120 cm. high; fls. VII; fr. VIII; perennial. Temperate Eurasia; locally in Ki., Ku. Forest shade. Fig. 424.

2. **Phleum paniculatum** Huds. (Hitch.368). Culms 15–45 cm. high; fls. IV; fr. V; annual. Temperate Eurasia; locally in Ku. Moist or marshy ground.

40. **Brachyelytrum** Beauv. 短穎草属 (Tuan Ying Ts'ao Shu; Short-glumed-grass Genus)

Perennials with narrow few-fld. panicles: spikelets narrow, 1-fld.; the *rachilla prolonged behind the palea* into a slender naked bristle: *glumes minute*, unequal; the first sometimes obsolete; the second linear or aristate; *lemma* firm, 5-*nerved*, terminating in a long straight awn. 2 species, 1 in eastern North America, the other in eastern Asia. (Greek: *brachus*, short, and *elutron*, husk, alluding to the short glumes.)

1. **Brachyelytrum japonicum** (Hack.) Matsum. (Mak.F.844). Culms 50–100 cm. high; fls. VII; fr. VIII. Eastern Asia; locally in An., Che. Moist or shady woods. Fig. 425.

41. **Muhlenbergia** Schreb. Muhly 鼠茅属 (Shu Mao Shu; Large Mouse-grass Genus)

Perennials with scaly rootstocks and contracted panicles: spikelets small, *without prolonged rachilla*: *glumes shorter than the floret*, thin, 1-nerved or nerveless; *lemma* membranaceous, 3-nerved, longer than the glumes, *terminating in a* very *slender awn*, About 100 species, mostly American; 3 in China. (After Dr. Henry Muhlenberg. 1753–1815, a distinguished American botanist.)

1. **Muhlenbergia japonica** Steud. (Hitch. 433). Culms 30–90 cm. high; fls. VIII; fr. IX; glumes minute. Northern India to Japan; locally in An., Che., Ki., Ku, Shady or moist ground. Fig. 426.

42. **Sporobolus** R. Br. Dropseed 鼠尾粟属 (Shu Wei Su Shu)

Perennials or annuals with contracted panicles (ours): spikelets 1-fld., *awnless*, without prolonged rachilla: *glumes shorter than the spikelet*; lemma membranaceous. 1-nerved, equal to or longer than the unequal glumes; palea equaling the lemma, or a little shorter, finally splitting between the two strong nerves: *fr. a utricle*; pericarp loosely enclosing the seed, often thin and evanescent. About 100 species, mostly American; 5 in China. (Greek: *spora*, seed, and *ballein*, to cast forth, alluding to the free seeds.)

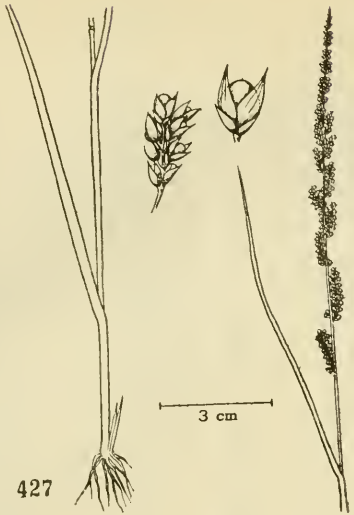
Key to the Species

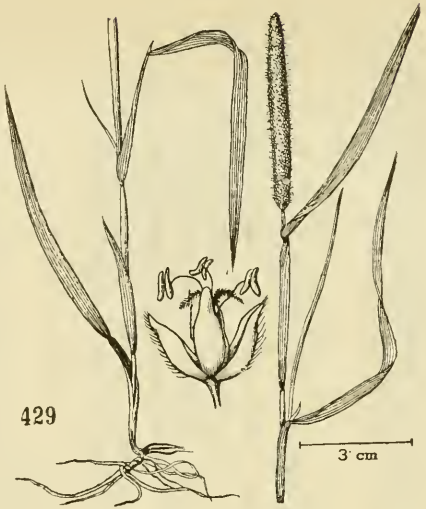
Second glume about half as long as the floret: panicle 15–40 cm. long..	1.	*S. elongatus*
Second glume equaling or a little shorter than the floret.		
Perennial: panicle 3–8 cm. long.....	2.	*S. virginicus*
Annual: panicle 1.5–3.5 cm. long.....	3.	*S. piliferus*

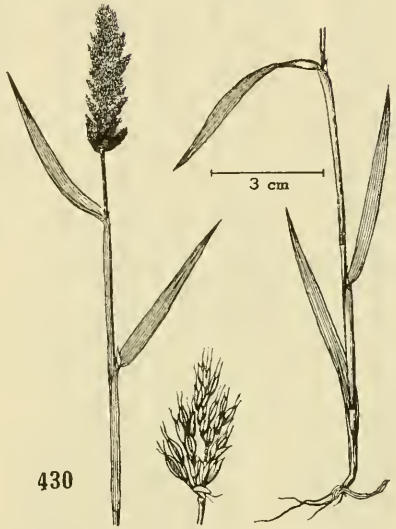
1. **Sporobolus elongatus** R. Br. 鼠尾粟 (Shu Wei Shu; Rat-tail Grass) (R.Br.P.170). Culms 30–100 cm. high; fls. VIII; fr. IX. Warm regions; locally in Che., Ki., Ku. Waste roadsides and fields. Fig. 427.
2. **Sporobolus virginicus** (L.) Kunth (Hitch. 418). Culms 15–30 cm. high; fls. VIII; fr. IX; perennial, with strong rhizomes. Pantropics; locally in Che. Sandy shores.
3. **Sporobolus piliferus** (Trin.) Kunth (H.F.7:251). Culms 8–15 cm. high; annual. India to Korea, Japan and the Philippines; locally in Che., Ki. Damp ground or rocky hills.

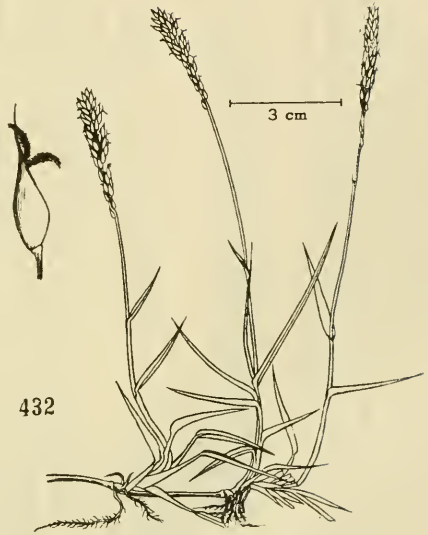
43. **Milium** Linn. Millet Grass 粟草属 (Shu Ts'ao Shu)

Perennials (ours) with flat blades and open panicles: spikelets 1-fld., dorsally









427. Sporobolus elongatus
428. Stipa sibirica

429. Alopecurus aequalis
430. Polypogom higegaweri

431. Phaenosperma globosa
432. Zoysia sinica

compressed, without prolonged rachilla: *glumes* subequal, 3-nerved, slightly *longer than the floret*; *lemma indurate, awnless, without distinct callus.* Five species, north temperate regions; one in China. (Ancient Latin name for millet.)

1. **Milium effusum** Linn. 粟草 (Shu Ts'ao; Millet-grass) (Hitch. 436). Culms 90–150 cm. high; fls. IV; fr. V. North temperate zone; locally in Ku. Shady thickets and forests.

44. **Aristida** Linn. 三芒草属 (San Mang Ts'ao Shu; Three-awned-grass Genus)

Tufted annuals or perennials: blades narrow, usually convolute; spikelets 1-fld., in usually narrow panicles: florets disarticulating above the glumes with a hard obconical hairy callus at base; glumes subequal, persistent, very narrow, keeled, acute or acuminate; lemma somewhat indurated, cylindrical, convolute, acuminate, *tip produced into a long 3-partite* naked or feathery *awn* twisted below the branches; palea thin, enclosed in the lemma, sometimes minute or none: grain narrow, free within the lemma; about 200 species, mostly in the warm arid or subarid regions of both hemispheres; 3 known from China. (Latin: *arista*, awn.)

1. **Aristida cumingiana** Trin. & Rupr. (H.F.7:224). Annual, 15–25 cm. high; fls. IX–XI. Tropical and subtropical eastern Asia and the Philippines; locally in An., Ki., Ku. Grassy slopes.

45. **Stipa** Linn. Needlegrass 醉馬草属 (Tsui Ma Ts'ao Shu; Horse-intoxicating-grass Genus)

Rather tall perennials with contracted or open panicles: spikelets 1-fld., lanceolate or linear, without prolonged rachilla: *glumes* subequal, 3-several-nerved, *longer than the floret*; *lemma* terete, *firm or indurate*, strongly convolute, *with pointed or obtuse bearded callus*, terminating in a geniculate or rarely straight *awn*. About 100 species, mostly of temperate arid regions; 20 in China. (Greek: *stupa* or *stipa*, coarse part of the flax, tow, alluding to the feathery awns of *S. pennata* the type species.)

Key to the Species

Panicle compound, the brs. 2–5-nate, erect or spreading: spikelets 6–10 mm. long: awns twisted, 10–25 mm. long ..... 1. *S. sibirica*
Panicle simple, the brs. 1–2-nate, appressed: spikelets 13–14 mm. long: awns straight, 25–35 mm. long ..... 2. *S. grandifolia*

1. **Stipa sibirica** (L.) Lam. (H.F.7:231). Culms 60–150 cm. high; fls. VIII; fr. IX. Temperate Asia; locally in An., Che., Ku. Grassy slopes, forests, open thickets. Fig. 428.
2. **Stipa grandifolia** Keng (Si.4:322). Culms about 1 m. high; fls. VIII; fr. IX. Southeastern China and Japan; locally in An. Shady woods.

46. **Alopecurus** Linn. Foxtail Grass 看麥娘属 (K'an Mai Niang Shu)

Annuals (ours) with terminal spikelike panicles: *pedicels not jointed*: *spikelets* strongly *laterally compressed, falling entire*, without prolonged rachilla: glumes equal, 3-nerved, usually connate at the base, about as long as the floret; lemma membranaceous or thinner than the glumes, faintly 5-nerved, dorsally awned from below the middle;

the margins connate below; palea none. About 30 species, in north temperate zone: 6 in China. (Greek: *alopex*, fox, and *oura*, tail, alluding to the cylindric panicle.)

Key to the Species

Spikelets 2–3 mm long	Spikelets 5–6 mm. long; awn exserted	1. *A. japonicus*
	Awn 1.5–3.5 mm. long, included or scarcely exserted	2. *A. aequalis*
	Awn 6–10 mm. long, distinctly exserted.....	3. *A. mandshuricus*

1. **Alopecurus japonicus** Steud. (Mak.F.845). Culms about 30 cm. high; fls. IV; fr. V. Central and southern China to Japan; locally in Ku. Open grassy roadsides and fields.
2. **Alopecurus aequalis** Sobol. Short-awn Foxtail 看麥娘 (K'an Mai Niang; Wheat-watching Woman) (Hitch. 359). Culms 15–45 cm. high; fls. IV; fr. V. Temperate and warm regions of Eurasia; locally in Che., Ki., Ku. Moist or swampy ground. Fig. 429.
3. **Alopecurus mandshuricus** Litvinov (Sched.Herb.Fl.Ross.6:138). Culms 20–30 cm. high; fls. IV; fr. V. Eastern China; locally in Ku. River banks.

47. **Polypogon** Desf. Beardgrass 蓪草属 (Tzŭ Ts'ao Shu)

Perennials or annuals with spikelike or pyramidal panicles: spikelets minute; the *pedicels disarticulating* a short distance *below the glumes* and leaving a short pointed callus attached: *glumes* equal, 1-nerved, keeled, each with a straight *awn* from the tip or from between the 2-lobed apex; florets freely deciduous; lemma hyaline, glabrous, much shorter than the glumes, awned or awnless. About six species, in warm regions; two in China. (Greek: *polus* much, and *pogon*, beard, alluding to the bristly inflorescence.)

Key to the Species

Awns of glumes 2–4 times as long as the spikelet		1. *P. monspeliensis*
Awns of glumes shorter or scarcely longer than the spikelet		2. *P. higegaweri*

1. **Polypogon monspeliensis** (L.) Desf. Rabbitfoot Grass 蓪 (Tzŭ; Field Grass) (Hitch. 363). Culms 15–60 cm. high; fls. IV; fr. V. Tropical and temperate zones; locally in Ku. Moist grassland or waste roadsides.
2. **Polypogon higegaweri** Steud. Ditch Polypogon (Mak.F.848). Culms 20–100 cm. high; fls. IV; fr. V. China, India, Japan; locally in Hup., Ki. Stream banks, swamps, ditches and moist ground. Fig. 430.

"*Polypogon lutosus* was a misapplied name. The American grass so called is *P. interruptus* HBK. But the Asiatic species is not the same. I examined all Asiatic material and descriptions and, after deciding this should be *P. higegaweri* Steud., found that Keng used this name in his 'Manual of Grasses of Kiangsu.'"—Agnes Chase.

48. **Phaenosperma** Munro 顯子草属 (Hsien Tzŭ Ts'ao Shu; Grain-prominent-grass Genus)

Tall *perennials* with elongate open panicles: *spikelets* 1-fld., awnless, *dorsally compressed*, without prolonged rachilla, *disarticulating below the glumes* from the short pedicels: glumes thin, unequal, the first 1-3-, the second 3-5-nerved; lemma membranaceous, 3-nerved, equaling the second glume, with a similar but 2-nerved

palea: grain globose, exposed at maturity. Monotypic. (Greek: *phaino*, I appear, and *sperma*, seed, in allusion to the turgid caryopsis pressing the lemma and palea apart at maturity.)

1. **Phaenosperma globosa** Munro (Mak.F.832). Culms 1.0–1.5 m. high; fls. V; fr. VI. Temperate eastern Asia; locally in An., Che., Ki., Ku. Ravines and shady woods. Fig. 431.

49. **Sphaerocaryum** Nees 圓粟草屬 (Yüan Su Ts'ao Shu; Round-grain-grass Genus)

Slender *annuals* with *cordate blades* and small panicles: *spikelets* minute, *dorsally compressed*, without prolonged rachilla, falling entire or the glumes more readily deciduous: glumes hyaline, the first shorter, nerveless, the second 1-nerved, equaling or a little shorter than the floret; lemma and palea subequal, thin, minutely puberulent. Monotypic. (Greek: *sphaira*, a sphere, and *karuon*, a nut, alluding to the spherical fruits.)

1. **Sphaerocaryum malaccense** (Trin.) Pilger (*S. pulchellum* Merr.) (L.S.J.7:199). Culms 10–30 cm. high; fls. X; fr. XI. India to southern China, Formosa and Malaysia; locally in An. Marshes and moist or shady ground.

"*Isachne pulchella* Roth, the basis of *Sphaerocaryum pulchellum* Merr., proves to be a species of *Isachne*."—Agnes Chase.

Tribe VII. **Zoysieae** 結縷草族 (Chieh Lü Ts'ao Ts'u)

Spikelets 1-fld., perfect or mixed with staminate ones when in fascicles, disarticulating below the glumes or each fascicle falling off as a whole from the main axis: glumes 2 (the first wanting in ours), coriaceous or membranaceous, frequently awned, the first sometimes minute or wanting; lemma always awnless, membranaceous or hyaline; palea sometimes obsolete: inflorescence a spike-like raceme or a spike; the short pedicels frequently more or less flattened or thickish.

A single genus in our flora ..... 50. *Zoysia*

50. **Zoysia** Willd. 結縷草屬 (Chieh Lü Ts'ao Shu; Knotted-strands Genus)

Low perennials with creeping rootstocks and spike-like racemes: glume 1 (the first wanting), coriaceous, shining, strongly laterally compressed, minutely awned or awnless; the margins connate below; lemma and palea much smaller, thin, the latter sometimes none. Five species, temperate Asia to Australia; three in China. (After Karl von Zois, 1756–1800, German botanist.)

Key to the Species

Spikelets 3–4 mm. long: blades flat, rather stiff ..... 1. *Z. japonica*
Spikelets 5–8 mm. long: blades lax ..... 2. *Z. sinica*

1. **Zoysia japonica** Steud. Japanese Lawngrass (Mak.F.831). Culms 15 cm. high; fls. IV; fr. V. Eastern Asia; locally in Che., Ki., Ku. Meadows and sandy slopes.
2. **Zoysia sinica** Hance (J.B.1869:168). Culms 15–30 cm. high; fls. V; fr. VI. Eastern Asia; locally in Che., Ku. Sandy beaches. Fig. 432.

"We have very little material of *Z. sinica*, and the descriptions of vegetative parts are not detailed. Mr. Ian Forbes, who is working on them genetically, says they hybridize freely." Agnes Chase.

Tribe VIII. **Phalarideae** 鼠草族 (Yi Ts'ao Ts'u)

Spikelets with one perfect terminal floret and a pair of staminate or neuter florets below; the latter (in ours) reduced to two small scale-like lemmas, falling attached to the fertile floret: glumes 2, equaling the spikelet (in ours); fertile lemma indurate, awnless; stamens 3, but 6, 4 or 2 also found in this tribe: inflorescence an open, contracted or spike-like panicle.

A single genus in our flora ..... 51. *Phalaris*

51. **Phalaris** Linn. Canary Grass 鼠草属 (Yi Ts'ao Shu)

Perennials (ours) with contracted panicles: spikelets 1-fld. with 2 small sterile lemmas attached below, laterally compressed, awnless: glumes equal, 3-nerved, exceeding the terminal floret; fertile lemma acute, finally indurate, enclosing a similar palea. About 20 species, in temperate zones; 2 in China. (Ancient Greek name for a grass.)

1. **Phalaris arundinacea** Linn. Reed Canary Grass 鼠草 (Yi Ts'ao; Spiranthes Grass) (Hitch.555). Culms 60–120 cm. high; fls. IV; fr. V. Temperate regions; locally in Ku. Marshes, river banks and moist places. Fig. 433.

Tribe IX. **Oryzeae** 稻族 (Tao Ts'u)

Spikelets perfect, 1-fld. or with two small scale-like lemmas below; the pedicel sometimes elongate, jointed in the middle, disarticulating, the upper part forming a stipe below the spikelet; glumes 2, minute or more frequently obsolete; fertile lemma 7–5-nerved, awnless or terminally awned; palea 2–3-nerved, the marginal nerves if present enclosed by the lemma; stamens 6, 3, 2 or 1: hilum linear instead of punctiform; aquatic or marshy perennials or annuals with open panicles or racemes.

Key to the Genera

Spikelets subterete or slightly laterally compressed; the pedicel elongate into a stipe below the spikelet: stamen 1 ..... 54. *Chikusichloa*

Spikelets strongly laterally compressed; the rachilla not elongate into a stipe below the floret: stamens 6 or 3.

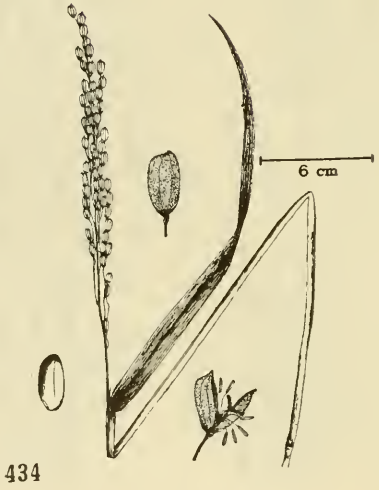
Sterile lemmas 2, small but distinct ..... 52. *Oryza*

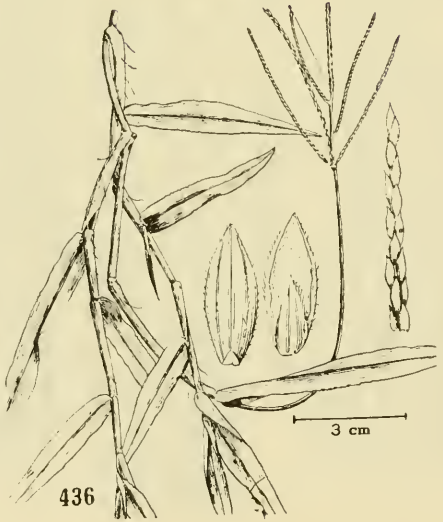
Sterile lemmas wanting ..... 53. *Leersia*

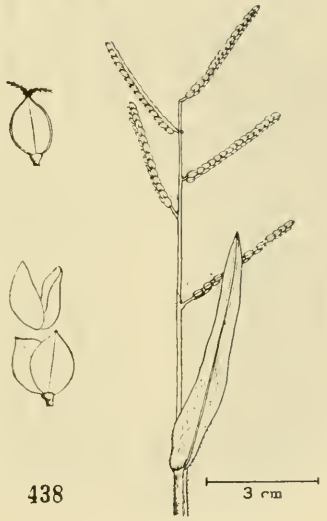
52. **Oryza** Linn. Rice 稻属 (Tao Shu)

Aquatic or terrestrial annuals or perennials with flat blades and terminal panicles: *spikelets* 1-fld., strongly laterally compressed, *with* 2 minute scaly or bristle-like *sterile lemmas* attached below: glumes obsolete or represented by 2 minute scale-like appendages at apex of the pedicel; fertile lemma chartaceous, awned or awnless, 5-nerved, the marginal nerves firmly clasping those of the similar palea. About 10 species, mostly Asiatic and African; one widely cultivated. (Name from *oruzu*, ancient Greek name for rice.)

1. **Oryza sativa** Linn. Rice 稻 (Tao) (Hitch.556). Culms about 1 m. high; fls. VIII;







433. Phalaris arundinacea
434. Oryza sativa

435. Zizania latifolia
436. Digitaria sanguinalis

437. Echinochloa colonum
438. Paspalum thunbergii

fr. IX. Cultivated in all warm countries with sufficient moisture; locally in An., Che., Ki., Ku. Flooded fields or dry ground. Fig.434.

53. **Leersia** Sw. 鞘糠草属 (Shao K'ang Ts'ao Shu; Sheath-grass Genus)

Aquatic or swamp-loving perennials with creeping rhizomes and terminal panicles; *spikelets* 1-fld., *without sterile lemmas* attached below, strongly *laterally compressed*: glumes none: lemmas awnless, 5-nerved, the lateral nerves close to the margins and firmly clasping those of the similar palea. About 15 species, in tropical and temperate zones; 3 in China. (After Johann Daniel Leers, a German botanist of the 18th century.)

Key to the Species

Panicle subsimple: spikelets 4–6 mm. long: stamens 6; the anthers 2–3 mm. long ..... 1. *L. japonica*
Panicle compound: spikelets 5–8 mm. long: stamens 2–3; the anthers 1–2 mm. long ..... 2. *L. hackelii*

1. **Leersia japonica** Mak. (Mak.F.874). Culms 20–60 cm. high; fls. and frs. VI–X. Eastern Asia; locally in Che., Ku. Ponds and marshes.
2. **Leersia hackelii** Keng (*L. oryzoides* (L.) Sw. var. *japonica* Hack.) (Mak.F.874). Culms 30–90 cm. high. Southeastern China and Japan; locally in Che. Under woods or by ponds.

54. **Chikusichloa** Koidz. 山澗草属 (Shan Chien Ts'ao Shu)

Aquatic perennials with terminal open panicles: *spikelets* 1-fld., subterete, the pedicel elongate, jointed about the middle, disarticulating, the upper part scabrous, falling attached to the spikelet; glumes wanting; lemma strongly 5–7-nerved, acuminate or tapering into a slender awn. Two species, both found in China. (Name composed of the Japanese *chikusi*, and the Greek *chloa* grass.)

1. **Chikusichloa aquatica** Koidz. 山澗草 (Shan Chien Ts'ao; Mountain-torrent Grass) (Bo.Ma.T.39:23). Culms 80–150 cm. high; fls. VII; fr. VIII. Southeastern China and Japan; locally in Ku. Sandy stream sides.

Tribe X. **Zizanieae** 菰族 (Ku Ts'u)

Closely related to *Oryzeae*, but differing in the unisexual spikelets which have only a terminal floret; the two lateral florets and glumes being entirely suppressed: aquatic perennials or annuals, with pistillate and staminate spikelets in the same panicle or in different panicles.

A single genus in our flora ..... 55. *Zizania*

55. **Zizania** Linn. Wild Rice 菰属 (Ku Shu)

Tall aquatic perennials (ours) with stout creeping rhizomes and large terminal monoecious panicles: spikelets 1-fld.; the pistillate terete, borne on the appressed upper brs.; the staminate somewhat laterally compressed, borne on the expanded or erect lower brs. of the same infl.: glumes wanting; lemma 5-nerved, chartaceous, or in the staminate membranaceous, tapering into a slender awn in the pistillate. Three species, in the northern hemisphere; one in China. (Greek: *zizanion*, the ancient name of a wild grain.)

1. **Zizania latifolia** (Griseb.) Turcz. ex Stapf 菰 (Ku) (Mak.F.874). Culms 90–180 cm. high; fls. IX; fr. X. Eastern Asia; locally in Ku. Streams, lakes and marshes. Fig. 435.

In the Shanghai and Nanking vegetable markets swollen shoots, called Water Bamboo, which are smut-infected shoots of *Zizania latifolia*, appear under the names 茭筍 (Chiao Sun; aquatic bamboo) and 茭白 (Chiao Pê). The inner fleshy portion is used as a cooked vegetable until the maturing smut spores produce black streaks in the white flesh, and it becomes inedible. (Read 40).

Tribe XI. **Paniceae** 黍族 (Shu Ts'u)

Spikelets 2-fld.; the upper floret perfect; the lower staminate or neuter (perfect in *Isachne*): glumes 2, thinner than the fertile lemma; the first smaller, minute or wanting; sterile lemma resembling the second glume in texture and nervation; fertile lemma firmer or crustaceous at maturity (except in *Pseudoraphis*), awnless, embracing a palea similar in texture: infl. an open, contracted, or spike-like panicle, or of one to many unilateral spike-like racemes arranged racemose, digitate or solitary.

Key to the Genera

A. Spikelets, at least a part of them, subtended or surrounded by 1–many bristles; or the rachis produced beyond the spikelets.
  Spikelets falling off from the bristles or the rachis..... 65. *Setaria*
  Spikelets falling together with the bristles or the rachis.
    Bristles solitary to each spikelet or wanting at the lower part of the rachis ..... 66. *Pseudoraphis*
    Bristles usually many to each spikelet ..... 67. *Pennisetum*
AA. Spikelets neither subtended by bristles nor the rachis produced beyond the spikelets.
  B. Spikelets disarticulating above the glumes, usually with 2 fertile florets..... 56. *Isachne*
  BB. Spikelets disarticulating below the glumes, usually with a single fertile floret.
    C. Fertile lemma leathery-indurated; the margins hyaline, not inrolled; spikelets in digitate racemes ..... 57. *Digitaria*
    CC. Fertile lemma chartaceous-indurated; the margins not hyaline, inrolled; spikelets not in digitate racemes.
      D. Spikelets laterally compressed or somewhat oblique, the second glume broad, somewhat inflated..... 58. *Sacciolepis*
      DD. Spikelets dorsally compressed, not oblique.
        E. Infl. an open diffuse panicle ..... 59. *Panicum*
        EE. Infl. of few to many spike-like racemes arranged paniculate, racemose, or digitate.
          F. Glumes or sterile lemma awned (except in some ssp. of *Echinochloa*).
            Spikelets awned from the glumes..... 60. *Oplismenus*
            Spikelets awned or awn-tipped from the sterile lemma..... 61. *Echinochloa*
          FF. Both glumes and sterile lemma awnless.
            G. First glume well developed..... 62. *Brachiaria*
            GG. First glume typically wanting (sometimes developed in *Paspalum distichum*).
              Back of the fertile lemma (the convex side)

turned towards the rachis ..... 63. *Paspalum*
Back of the fertile lemma turned away from the rachis, first glume and rachilla joint forming a swollen ring-like callus below the spikelet. ..... 64. *Eriochloa*

56. **Isachne** R.Br. 柳葉箬屬 (Liu Yeh Jo Shu)

Perennials or annuals with flat blades and terminal panicles: *spikelets* 2-fld., *disarticulating above the glumes*, which are sub-equal and about as long as the spikelet: florets indurate and planoconvex, or the lower floret staminate, with membranaceous lemma. More than 80 species, in tropical and temperate zones; 8 in China. (Greek: *isos*, and *achne*, chaff, alluding to the similar lemmas of the type species.)

Key to the Species

Blades linear-lanceolate, 2–13 cm. long: spikelets 2.0–2.5 mm. long..... 1. *I. globosa*
Blades ovate-lanceolate, 1.0–2.5 cm. long: spikelets about 1.5 mm. long.... 2. *I. pulchella*

1. **Isachne globosa** (Thunb.) Ktze. 柳葉箬 (Liu Yeh Jo; Willow-leaved Bamboo) (Mak.F.833). Spreading perennial with ascending brs. 20–60 cm. high; fls. VI; fr. VII. India to Japan, and south to Australia; locally in An., Che., Ku. Ditches and moist ground.
2. **Isachne pulchella** Roth (Be.F.414). Prostrate annual with ascending brs. Southeastern Asia; locally in Che. Streamsides and rice fields.

"This *Isachne pulchella* Roth and *Sphaerocaryum* (a single species) were confused. Superficially they resemble each other. The name '*Isachne polygonoides* (Lam.) Doell,' a species described from French Guiana and found in Brazil, was misapplied to the true *Isachne pulchella*."—Agnes Chase.

57. **Digitaria** Heister Crabgrass 指草屬 (Chih Ts'ao Shu; Finger-grass Genus)

Annuals (ours) with subdigitate spikelike racemes: *spikelets* 1-*fld.* subsessile, in two rows on one side of a continuous rachis, *disarticulating below the glumes*: first glume minute or wanting; second glume similar to the sterile lemma or smaller; *fertile lemma indurate, with hyaline flat margins*, enclosing a palea of like texture. More than 100 species, chiefly in the warmer parts of the Old World; 14 in China. (Latin: *digitus*, finger, alluding to the digitate inflorescence of the type species, *D. sanguinalis*.)

Key to the Species

a. Spikelets elliptic; second glume about as long as the sterile lemma; fertile floret dark brown at maturity.
Spikelets 2.0–2.2 mm. long; first glume hyaline, evanescent ..... 1. *D. ischaemum*
Spikelets 1.5–1.8 mm. long: first glume wanting ..... 2. *D. violascens*
aa. Spikelets narrowly lanceolate; second glume 1/2–3/4 the length of the sterile lemma; fertile floret pale or lead-colored at maturity.
Culms usually stout: racemes 3–10, relatively rigid.
Hairs of the sterile lemma grayish, appressed even at maturity 3. *D. sanguinalis*
Hairs of the sterile lemma fulvous, spreading at maturity..... 3a. *D. sanguinalis* var. *ciliaris*
Culms slender and delicate: racemes 2–4, rather lax. ..... 4. *D. chinensis*

1. **Digitaria ischaemum** (Schreb.) Muhl. Smooth Crabgrass (Mak.F.837). Ascending annual, 15–50 cm. high; fls. VII; fr. IX. Eurasia; locally in Che., Ki., Ku. Open fields, waste places.
2. **Digitaria violascens** Link. (Hitch.576). Ascending annual, 20–75 cm. high; fls. IX; fr. XI. Pantropic; locally in Che., Ki., Ku. Open fields, grassland.
3. **Digitaria sanguinalis** (L.) Scop. Crabgrass 馬唐 (Ma T'ang) (Hitch.575). Annual, ascending to 1 m.; fls. VII; fr. VIII. Temperate and tropical regions; locally in An., Che., Ki., Ku. Open ground, waste places. Fig. 436.

3a. **Digitaria sanguinalis** var. **ciliaris** (Retz.) Parl. 毛馬唐 (Mao Ma T'ang) (Hitch.576). Ascending annual, 15–60 cm. high; fls. VII; fr. VIII. Temperate and tropical regions; locally in Che. Waste places, roadsides.

4. **Digitaria chinensis** Hornem. (*Syntherisma tenuispica* (Rendle) Keng; *D. tenuispica* Rendle) (F.H.E.3:326;I.K.Supp.9:272). Slender ascending annual, 10–30 cm. high; fls. VII; fr. VIII. India to China and Malaysia; locally in An., Che., Ki., Ku. Shady places.

58. **Sacciolepis** Nash 囊穎草屬 (Nang Ying Ts'ao Shu)

Annuals or perennials with dense spike-like panicles: *spikelets* oblong-conic, more or less *oblique*: first glume usually small; second glume strongly many-nerved, similar to the sterile lemma, but basally gibbous or dorsally saccate; *fertile lemma chartaceous indurate, with inrolled margins*, about one-half as long as the spikelet; palea free at the summit. More than 30 species, tropical and temperate, mostly Africa; 2 in China. (Greek: *sakkos*, bag, and *lepis*, scale, alluding to the saccate second glume.)

1. **Sacciolepis indica** (L.) Chase 囊穎草 (Nang Ying Ts'ao; Saccate-glumed Grass) (Hitch.710). Culms 10–60 cm. high; fls. IX; fr. X. Asia and Australia; locally in An., Ki., Ku. Moist or swampy places.

59. **Panicum** Linn. 黍屬 (Shu Shu; Millet Genus)

Perennials or annuals of various habit with *infl. in* open or contracted *panicles*: *spikelets dorsally compressed*: glumes herbaceous; the first small or minute; the second usually equaling the sterile lemma and similar in texture; *fertile lemma chartaceous-indurate*, equaling or a little shorter than the spikelet. About 400 species, mostly tropical and subtropical; 14 in China. (Ancient Latin name for the common millet, *Setaria italica*.)

Key to the Species

a. Perennial: culms more or less rigid.
  Culms stout, with strong creeping rhizomes ..... 1. *P. repens*
  Culms wiry, without creeping rhizomes ..... 2. *P. cristatellum*
aa. Annual: culms relatively soft in texture.
  Spikelets 3.5–5.0 mm. long ..... 3. *P. miliaceum*
  Spikelets 2–3 mm. long.
    First glume broad, clasping, about 1/3 the length of the spikelet 4. *P. psilopodium*
    First glume narrow, about 1/2 the length of the spikelet ..... 5. *P. bisulcatum*

1. **Panicum repens** Linn. (Hitch.697). Culms 30–100 cm. high; fls. V; fr. VI. Tropical and subtropical regions; locally in Che. Moist ground and swampy places.
2. **Panicum cristatellum** Keng (Si.11:412). Culms 30–60 cm. high; fls. VI; fr. VIII; perennial. Southeastern China; locally in Ku. Marshy ground.

3. **Panicum miliaceum** Linn. Broomcorn Millet 稷 (Chi; Panicled Millet) (Hitch.690). Culms 60–120 cm. high; fls. VI; fr. VII. Temperate regions; locally in Ku. Cultivated or escaped into waste places.
4. **Panicum psilopodium** Trin. (H.F.7:46). Culms 20–60 cm. high; fls. VIII; fr. IX. India to China and the Philippines; locally in Che., Ku. Moist roadsides or swampy places.
5. **Panicum bisulcatum** Thunb. (Mak.F.835). Culms 20–120 cm. high; fls. IX; fr. X; spikelets dark purple. China to India and Japan; locally in Che., Ki., Ku. Moist ground or grassy fields.

60. **Oplismenus** Beauv. 縮箬属 (So Jo Shu)

Usually creeping shade-loving annuals with flat thin blades and few to several one-sided spike-like alternate *racemes* or clusters of spikelets along a main axis: spikelets subsessile, terete or somewhat compressed laterally: *glumes* subequal, the first *long-awned*, the second shortly awned or awnless; sterile lemma exceeding the glumes and the fertile floret; *fertile lemma chartaceous-indurate*, smooth, usually with a minute crest. About 10 species, in tropical and temperate regions; 4 in China. (Greek: *hoplismenos*, armed, alluding to the awned spikelets.)

1. **Oplismenus undulatifolius** (Ard.) Roem. & Schult. 縮箬 (So Jo; Small Grain) (Mak.F.834). Culms 30–60 cm. high; fls. VIII; fr. IX. India to Japan and Malaysia; locally in An., Che., Ki., Ku. Shady moist ground.

61. **Echinochloa** Beauv. 稗属 (Pai Shu)

Annuals (ours) with rather compact panicles of several densely fld. racemes: spikelets plano-convex, subsessile, crowded on one side of a continuous rachis: first glume about half as long as the spikelet; second glume and *sterile lemma* equal, the latter *mucronate to long-awned*; lemma chartaceous, acuminate, the margins inrolled embracing a palea of like texture; sometimes the latter free at the apex. About 15 species, in tropical and subtropical regions; 3 species and 4 varieties in China. (Greek: *cchinos*, hedgehog, and *chloa*, grass, alluding to the echinate spikelets.)

Key to the Species

a. Spikelets 4–5 mm. long, 1.5–2.0 mm. wide ..... 4. *E. hispidula*
aa. Spikelets 2–3 mm. long, 1.0–1.5 mm. wide.
  b. Racemes rather distant, simple, 1–2 cm. long: spikelets awnless, or with a very short point ..... 1. *E. colonum*
  bb. Racemes more or less approximate, compound, usually more than 2 cm. long: spikelets awned or mucronate.
    c. Spikelets usually awned; the awns variable in length, or at least on a part of the spikelets 5–10 mm. long.
      Panicle nodding: spikelets less strongly hispid, about 2 mm. long ..... 2. *E. cruspavonis*
      Panicle generally erect: spikelets strongly hispid, about 3 mm. long ..... 3. *E. crusgalli*
    cc. Spikelets usually awnless, or with the awn less than 3 mm. long.
      Panicle very dense; the racemes incurved at maturity .. 3c. *E. crusgalli* var. *frumentacea*
      Panicle looser; the racemes not incurved at maturity.

Racemes compound, ascending; spikelets strongly hispid 3a. *E. crusgalli* var. *mitis*

Racemes mostly simple, more or less appressed: spikelets less strongly hispid ..... 3b. *E. crusgalli* var. *zelayensis*

1. **Echinochloa colonum** (L.) Link Jungle Rice 芒稷 (Mang Chi; Bearded Millet) (Hitch.711). Culms 10–40 cm. high; fls. VI; fr. VII. Tropical and subtropical regions; locally in Che., Ki., Ku. Waste roadsides or moist ground. Fig. 437.
2. **Echinochloa cruspavonis** (HBK) Schult. (Hitch.715). Culms up to 1 m.; fls. VI; fr. VII. Tropical and temperate regions; locally in Ki., Ku. Marshes and wet places.
3. **Echinochloa crusgalli** (L.) Beauv. Barnyard Grass 稗 (Pai; Weed) (Hitch.712). Culms 30–100 cm. high; fls. VI; fr. VII. Cosmopolitan; locally in An., Ki., Ku. Moist fields or open ground.

3a. **Echinochloa crusgalli** var. **mitis** (Pursh) Peterm. (Hitch.714). Culms 30–90 cm. high; fls. VI; fr. VII. Cosmopolitan; locally in Ki., Ku. Wet or moist places.

3b. **Echinochloa crusgalli** var. **zelayensis** (HBK) Hitch. (Hitch.714). Culms 30–90 cm., high; fls. VI; fr. VII. Tropical and temperate regions; locally in Ku. Moist often alkaline places.

3c. **Echinochloa crusgalli** var. **frumentacea** (Roxb.) Wight Japanese Millet (Hitch. 714). Culms 1 m. or more high; fls. VI; fr. VII. Tropical and temperate regions. Cultivated or escaped into moist places.

4. **Echinochloa hispidula** (Retz.) Keng (*Panicum hispidum* Retz.) (Retz.0.5:18). Culms 60–120 cm. high; fls. VI; fr. VII. India, China, Japan; locally in An., Ku. Wet places or open ground.

62. **Brachiaria** (Trin.) Griseb. 臂形草属 (Pei Hsing Ts'ao Shu; Arm-like-grass Genus)

Annuals (ours) with terminal panicles of 2–many spike-like racemes: spikelets solitary or binate, arranged in 2 rows along one side of a slender triquetrous or narrowly winged rachis: *first glume* adaxial, about half as long as the spikelet; second glume and sterile lemma similar, 5–7-nerved; *glumes and sterile lemma awnless*; fertile lemma indurate, acute or obtuse; the margins inrolled, embracing a palea of like texture. About 80 species, in warm regions; 5 in China. (Latin: *brachium*, arm, alluding to the arm-like racemes.)

1. **Brachiaria villosa** (Lam.) A. Camus (*Panicum villosum* Lam.) (H.F.7:34). Culms 10–30 cm. high; fls. VII; fr. VIII. India to southeastern Asia; locally in An., Che., Ki. Open moist ground or cultivated soil.

63. **Paspalum** Linn. 雀稗属 (Ch'io Pai Shu)

Perennials with 2 to many *spike-like racemes* digitate or racemose at the summit of the culm and brs.: spikelets solitary or binate, in 2–4 rows along one side of a narrow or dilated rachis: *first glume wanting* (or rarely present); second glume and sterile lemma similar, membranaceous, 3-nerved; *fertile floret chartaceous-indurate*, usually obtuse, with the convex *back of the lemma towards the rachis*. More than 300 species, mostly Brazilian; 8 in China. (Greek: *paspalos*, a kind of millet.)

Key to the Species

a. Plants stoloniferous: first glume obsolete or well developed; fertile

floret less indurate ..... 1. *P. distichum*
aa. Plants not stoloniferous: first glume typically wanting; fertile floret strongly indurate.
Spikelets more or less puferulent; the fertile floret pale green at maturity ..... 2. *P. thunbergii*
Spikelets glabrous; the fertile floret dark brown at maturity.
Racemes 2–7, alternate, 1–4 cm. distant ..... 3. *P. orbiculare*
Racemes 2, binate, oı with a third below, 3–10 mm. distant..... 4. *P. hirsutum*

1. **Paspalum distichum** Linn. Knotgrass (Hitch.603). Culms 10–60 cm. high; fls. VI; fr. VIII. Tropical and temperate zones; locally in Ku. Ditches and wet places.
2. **Paspalum thunbergii** Kunth 雀稗 (Ch'io Pai; Bird Seed) (Mak.F.833). Culms 30–60 cm. high. Eastern Asia; locally in An., Che., Ki., Ku. Roadsides and fields. Fig. 438.
3. **Paspalum orbiculare** G. Forst. (L.S.J.7:216). Culms 20–100 cm. high; fls. VI; fr. VII. Old World Tropics; locally in Che. Moist places and grassy hillsides.
4. **Paspalum hirsutum** Retz. (Retz.0.2:7). Culms 20–50 cm. high; fls. VI; fr. VII. Tropical and subtropical Asia and Africa; locally in Che. Ditches, prairies and open fields.

64. **Eriochloa** HBK Cupgrass 野黍属 (Yeh Shu Shu)

Annuals (ours) with a terminal panicle of 2 to many *spike-like racemes*: spikelets solitary, *awnless*, imbricate in two rows along one side of a narrow rachis: rachilla jointed below the second glume, thickened into a ring or bead-like callus; first glume reduced to a minute sheath about the callus and adnate to it; second glume and sterile lemma subequal, membranaceous; fertile floret cartilaginous, with the convex *back of the lemma turned away from the rachis.* About 25 species, in tropical and temperate zones; 2 in China. (Greek: *erion*, wool, and *chloa*, grass, alluding to the pubescent spikelets and pedicels.)

1. **Eriochloa villosa** (Thunb.) Kunth 野黍 (Yeh Shu; Wild Millet) (Hitch.592). Culms 30–90 cm. high; fls. VI; fr. VII. China, Indo-China and Japan; locally in An., Che., Ki., Ku. Hill slopes, ravines and wet places.

65. **Setaria** Beauv. 狗尾草属 (Kou Wei Ts'ao Shu)

Perennials or annuals with narrow usually spiciform rarely open panicles: *spikelets* awnless, some or all *subtended by* 1 to several *bristles* (sterile brts.), and *falling free* from them: first glume 1/4 to 1/2 as long as the spikelet, 3–5-nerved or nerveless; second glume equaling the sterile lemma or shorter, several-nerved; fertile lemma coriaceous-indurate, smooth or transversely rugose. About 100 species, in tropical and temperate regions, mostly African; 9 in China. (Latin: *seta*, a bristle, alluding to the numerous bristles of the inflorescence.)

Key to the Species

a. Perennial: panicle broad to narrowly pyramidal: bristles single below a part or rarely below all of the spikelets.
Blades lanceolate to linear-lanceolate, conspicuously plaited; the lower ones narıowed at the base into petioles.
First glume ovate, acute; fertile lemma obscurely rugose.. 1. *S. palmifolia*

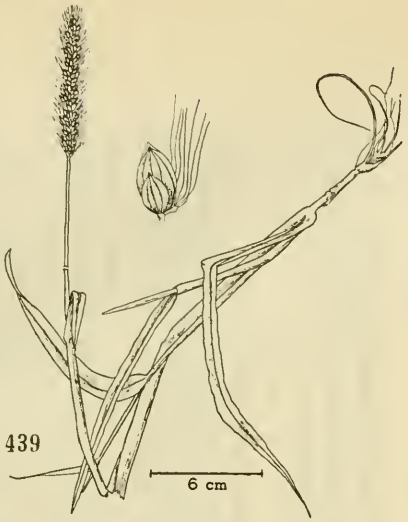
First glume somewhat rounded, obtuse or truncate; fertile lemma distinctly rugose ..... 2. *S. plicata*
Blades linear-lanceolate to linear, not plaited; the base never narrowed into petioles ..... 3. *S. chondrachne*
aa. Annual: panicle dense, cylindric, or more or less lofed: bristles few to many below each of the spikelets.
b. Grains falling from the sterile lemma and glumes when mature.. 5. *S. italica*
bb. Grains falling together with the sterile lemma and glumes.
Spikelets usually 3 or more in each cluster; the second glume equaling or as much as 1/4 shorter than the fertile floret.
Spikelets 2.0–2.5 mm. long, oblong, obtuse, slightly turgid when mature ..... 4. *S. viridis*
Spikelets about 3 mm. long, elliptic, acute, strongly turgid when mature ..... 6. *S. faberii*
Spikelets single, or with a rudimentary second in each cluster; the second glume about half as long as the fertile floret.. 7. *S. lutescens*

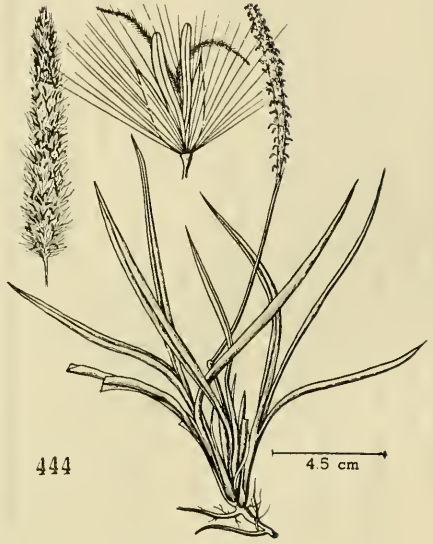
1. **Setaria palmifolia** (Koen.) Stapf Palmgrass (Hitch.726). Culms 1.0–1.5 m. high; fls. VIII; fr. IX. India to Formosa and Malaysia; locally in Che. Shady ravines or open moist valleys.
2. **Setaria plicata** (Lam.) T. Cooke (Ha.B.5:987). Culms 30–120 cm. high; fls. VIII; fr. IX. India to southeastern China; locally in Che., Ku. Shady or moist ground.
3. **Setaria chondrachne** (Steud.) Honda (*Panicum matsumurae* Hack.) (Mak. F. 840). Culms 60–120 cm. high; fls. VII; fr. VIII. China and Japan; locally in An., Ku. Waste roadsides or shady moist ground.
4. **Setaria viridis** (L.) Beauv. Green Bristlegrass 狗尾草 (Kou Wei Ts'ao; Dog-tail Grass) (Hitch.724). Culms 30–90 cm. high; fls. VI; fr. VII. Cosmopolitan; locally in An., Che., Ku. Fields or waste roadsides. Fig. 439.
5. **Setaria italica** (L.) Beauv. Foxtail Millet 小米 (Hsiao Mi; Millet) (Hitch.725). Culms 30–150 cm. high; fls. VIII; fr. IX. Eurasia; locally in An., Che., Ku. Cultivated for grain, also escaped.
6. **Setaria faberii** Herrm. (Hitch.725). Culms 30–120 cm. high; fls. VII; fr. VIII. China, Indo-China and Japan; locally in Che., Ki., Ku. Waste fields and open slopes.
7. **Setaria lutescens** (Weigel) Hubbard Yellow Bristlegrass (Hitch.718). Culms 15–90 cm. high; fls. VII; fr. VIII. Old World temperate and tropical regions; locally in An., Che., Ki., Ku. Fields and valley land.

66. **Pseudoraphis** Griff. 偽針茅屬 (Wei Chên Mao Shu)

Aquatic or swampy ground perennials with simple contracted or narrow panicles: spikelets subsessile along the slender simple brs. of the infl.; the brs. produced beyond the *spikelets* into slender *bristles* and *falling off with them* from the main axis. Five species from tropical and temperate Asia to Australia; 2 in China. (Greek: *pseudos*, false, and *raphis*, needle, alluding to the sterile needle-like ends of the panicle branches.)

1. **Pseudoraphis depauperata** (Nees) Keng 偽針茅 (Wei Chên Mao; False Needlegrass) (Mak.F.841). Culms 10–30 cm. high; fls. and frs. V–XI. India, Ceylon and eastern Asia; locally in Che., Ku. Pools or muddy ground.





439. Setaria viridis
440. Pennisetum alopecuroides

441. Arundinella setosa
442. Dimeria ornithopoda

443. Miscanthus sinensis
444. Imperata cylindrica

67. **Pennisetum** L. Rich. 狼尾草属 (Lang Wei Ts'ao Shu)

Perennials (ours) with spike-like cylindric panicles: spikelets 1–3 in each *involucre of* filiform *bristles* (sterile brts.); the involucre subsessile or shortly peduncled, *falling* from the main axis entire, *with the spikelets enclosed.* About 80 species, mostly African; 4 in China. (Latin: *penna*, feather, and *seta*, bristle, alluding to the plumose bristles of some species.)

1. **Pennisetum alopecuroides** (L.) Spreng. 狼尾草 (Lang Wei Ts'ao; Wolf-tail Grass) (Hitch.730). Culms 30–100 cm. high; fls. VIII; fr. IX. Temperate Asia to Australia; locally in An., Che., Ki., Ku. Waste roadsides and grassland. Fig. 440.

Tribe XII. **Arundinelleae** 野古草族 (Yeh Ku Ts'ao Ts'u)

The structure of the spikelets as in *Paniceae* from which it differs mainly in the *disarticulation above the glumes*: glumes 2, membranaceous or firmer, subequal or the first smaller; sterile lemmas more or less similar to the glumes; fertile lemma membranaceous or chartaceous at maturity, awned or awnless: infl. an open or contracted panicle.

A single genus in our flora ..... 68. *Arundinella*

68. **Arundinella** Raddi 野古草属 (Yeh Ku Ts'ao Shu)

Perennials with open or contracted panicles: spikelets (ours) binate, with pedicels of unequal length, arranged unilaterally on a slender continuous rachis: glumes persistent, equal or the first shorter, 3–5-nerved; lower floret staminate or neuter; fertile floret readily deciduous; the lemma chartaceous with pubescent callus. About 40 species, in tropical and temperate regions, mostly Asiatic; 10 in China. (Latin: a diminutive of *Arundo*, a reed.)

Key to the Species

Fertile lemma awnless or minutely awned ..... 1. *A. anomala*
Fertile lemma geniculately awned from the summit ..... 2. *A. setosa*

1. **Arundinella anomala** Steud. 野古草 (Yeh Ku Ts'ao; Wild Ancient-grass) (Mak. F.832). Culms 30–120 cm. high; fls. VIII; fr. IX. Eastern Asia; locally in An., Che., Ki., Ku. Grassy slopes or shady woods.
2. **Arundinella setosa** Trin. (H.F.7:70). Culms 30–120 cm. high; fls. VII; fr. IX; fertile lemma geniculately awned and with 2 slender lateral bristles. Tropical and subtropical Asia to New Guinea; locally in An., Che., Ku. Open ground or grassy slopes. Fig. 441.

Tribe XIII. **Andropogoneae** 高粱族 (Kao Liang Ts'u)

Spikelets 2-fld. or 1-fld. with a sterile lemma below, usually arranged in pairs at each node of a jointed or rarely continuous rachis: glumes 2, indurated, the first often larger than the second; sterile lemma membranaceous or hyaline, awnless; fertile lemma hyaline, usually awned or reduced to an awn: infl. various; the paired *spikelets* being both *perfect* in primitive forms, then modified to heterogamous pairs with the sessile *spikelets* of the pair *perfect and* the pedicelled *sterile*; at length the spikelets on the lower part of the rachis advanced to homagamous pairs, i.e. both spikelets of the pair being sterile.

Key to the Genera

A. Spikelets laterally compressed, solitary at each node of the rachis.. 69. *Dimeria*

AA. Spikelets dorsally compressed or rounded, binate at each node or ternate at the terminal node of the rachis, rarely solitary through the suppression of the pedicelled spikelets.
B. Spikelets all fertile and alike (the pedicelled spikelet of the pair sometimes reduced in *Microstegium*).
C. Rachis continuous; the spikelets falling from it.
Spikelets in a broad fan-shaped panicle, or in several to many fascicled racemes ..... 70. *Miscanthus*
Spikelets in a narrow spike-like panicle ..... 71. *Imperata*
CC. Rachis jointed; the joints falling with the sessile spikelets attached (except in *Spodiopogon cotulifer*).
D. Racemes numerous, from an elongated common axis.
Racemes subsessile, several-many-jointed, in a large plumose panicle. ..... 72. *Saccharum*
Racemes peduncled, few-several-jointed ..... 73. *Spodiopogon*
DD. Racemes many to 1 on a shortened common axis.
Racemes digitate or fascicled.
Culms erect: blades linear ..... 74. *Eulalia*
Culms straggling: blades lanceolate ..... 75. *Microstegium*
Racemes solitary..... 76. *Pogonatherum*
BB. Spikelets not all fertile, frequently different also in shape, size and awns.
E. Rachis joints and pedicels more or less stout; or if slender, the blades lanceolate, cordate.
F. Fertile lemma usually awned: rachis joints and pedicels villous or ciliate (except in *Arthraxon hispidus*).
Joints and pedicels stout, triquetrous..... 77. *Ischaemum*
Joints and pedicels slender, linear ..... 78. *Arthraxon*
FF. Fertile lemma typically awnless: joints and pedicels usually glabrous.
G. Racemes usually corymbose-digitate..... 79. *Phacelurus*
GG. Racemes solitary.
H. Sessile spikelet globose; pedicelled spikelet conspicuous: annual ..... 82. *Hackelochloa*
HH. Sessile spikelet oblong; pedicellate spikelet reduced.
Sessile spikelets sunken in the excavations of the thickened rachis.
Pedicelled spikelets similar to the sessile: rachis tenacious ..... 80. *Hemarthria*
Pedicelled spikelets not similar to the sessile: rachis fragile..... 81. *Rottboellia*
Sessile spikelets not sunken in the excavations of the thickened rachis. 83. *Eremochloa*
EE. Rachis joints and pedicels slender: blades narrow or broad, but never cordate.
I. Racemes paniculate or corymbose-digitate.
Joints and pedicels, especially the upper ones of the raceme, longitudinally grooved.
Racemes several-many-jointed, digitate ..... 84. *Bothriochloa*
Racemes 1–5–jointed, paniculate..... 85. *Capillipedium*
Joints of the pedicels not longitudinally grooved 86. *Sorghum*
II. Racemes binate or solitary.

J. Fertile spikelets dorsally compressed; the first glume usually inflexed above.
Racemes solitary; homogamus pairs wanting ..... 87. *Schizachyrium*
Racemes binate; homogamous pairs present ..... 88. *Cymbopogon*
JJ. Fertile spikelets terete; the first glume involute.
Homogamous pairs one to many, imbricate at the base of the several-many-jointed racemes ..... 89. *Heteropogon*
Homogamous pairs 2, approximate at the base of the 1–3-jointed racemes ..... 90. *Themeda*

69. **Dimeria** R. Br. 雁股茅屬 (Yen Ku Mao Shu)

Slender annuals with binate spike-like racemes (ours): *spikelets laterally compressed, solitary at each node*, unilaterally arranged on a slender continuous rachis: first glume keeled; fertile lemma awned. About 20 species, in tropical Asia and Australia; 3 in China. (Greek: *dis*, two, and *meros*, a share, alluding to the dimerous racemes of some species.)

1. **Dimeria ornithopoda** Trin. 雁股茅 (Yen Ku Mao; Wild-goose-feather-Grass) (M.F.75). Culms 15–45 cm. high; fls. X; fr. XI. India to eastern Asia and Australia; locally in Che., Ki., Ku. Waste roadsides and meadows. Fig. 442.

70. **Miscanthus** Anderss. 荻屬 (Ti Shu)

Tall perennials with *broad panicles* of several to many racemes: *spikelets all perfect*, binate, unequally pedicelled along a continuous rachis: glumes subequal, with villous callus; fertile lemma bifid or acute, with a long awn or awnless. About 10 species, mostly Asiatic and Polynesian; 8 in China. (Greek: *mischos*, pedicel, and *anthos*, flower, both spikelets of the pair being pedicelled.)

Key to the Species

Spikelets awnless; or the upper lemma with a very short included awn ..... 3. *M. sacchariflorus*
Spikelets awned; the awn long-exserted.
Panicle brs. slender, radiate: spikelets 3–5 mm. long, the pedicels finally recurved ..... 1. *M. floridulus*
Panicle brs. stout, fastigiate: spikelets 5–7 mm. long, the pedicels more or less straight ..... 2. *M. sinensis*

1. **Miscanthus floridulus** (Labill.) Warb. ex Schum. & Laut. (*M. japonicus* of Asiatic authors, non Anderss.) (Mak. F. 825). Culms 2–4 m. high; fls. VI; fr. VII. China to Japan and Polynesia; locally in An., Che., Ki., Ku. Grassy hills or roadside hedges.

"*Miscanthus japonicus* Anderss. (Öf. Svensk. Vet. Akad. Förh. 12: 166. 1856) is not based on *Saccharum japonicum* Thunb. as commonly assumed. Andersson cites *Eulalia japonica* Trin. and *Saccharum polydactylon* Thunb. These names are synonyms of *M. sinensis* Anderss. Andersson also cites *Zollinger* 28 from Japan, which is apparently *M. floridulus*. The description and plate in Labillardiere clearly identify his species, and his name (1824) is much earlier than that of Andersson (1856)."—Agnes Chase.

2. **Miscanthus sinensis** Anderss. Eulalia 芒 (Mang; Awn) (Hitch.740). Culms 1–2 m. high; fls. VIII; fr. IX. India to eastern Asia; locally in An., Che., Ki., Ku.

Open slopes and shady woods. Fig. 443.

3. **Miscanthus sacchariflorus** (Maxim.) Hack. 荻 (Ti; Reed) (Hitch.740). Culms 0.6–2.0 m. high; fls. IX; fr. X. Temperate Asia; locally in Che., Ku. Open moist ground.

71. **Imperata** Cyr. 白茅属 (Pai Mao Shu)

Perennials with long creeping rootstocks and terminal *spiciform* woolly *panicles*: spikelets all perfect, binate or sometimes solitary, usually unequally pedicelled on a slender *continuous rachis*: glumes about equal, membranaceous: lemmas hyaline, awnless; stamens 2 (ours). About 10 species, mostly in tropical regions; 1 in China. (Named for Ferrante Imperato.)

1. **Imperata cylindrica** (L.) Beauv. 白茅 (Pai Mao; White Grass) (Hitch.737). Culms 30–90 cm. high; fls. IV; fr. V. Tropical and temperate zones of the Old World; locally in An., Che., Ku. Grassy slopes and valley land. Fig. 444.

72. **Saccharum** Linn. 甘蔗属 (Kan Chê Shu; Sugar-cane Genus)

Tall perennials with silky pale or brownish terminal panicles of *numerous racemes*: spikelets all perfect, binate; one of the pair sessile; the other pedicelled; arranged on a *jointed fragile rachis*; awnless or the fertile lemma mucronate. About 12 species, chiefly Asiatic; 5 in China. (Latin: *saccharum*, sugar, because of the sweet juice.)

Key to the Species

Panicle broad, silvery-silky: spikelets 3.5–4.0 mm. long; glumes dorsally long-villous ..... 1. *S. arundinaceum*

Panicle narrow, purplish brown: spikelets 2.5–3.0 mm. long; glumes dorsally glabrous or sparsely pubescent ..... 2. *S. narenga*

1. **Saccharum arundinaceum** Retz. (H.F.7:119). Culms 2–7 m. high; fls. IX; fr. X. India to China and Malaysia; locally in An., Che. On slopes or grassland. Fig. 445.
2. **Saccharum narenga** (Nees) Hack. 河王八 (Ho Wang Pa; River Turtle) (L.S.J.7:231). Culms 1–3 m. high; fls. X; fr. XI. India to China; locally in Ku. Open grassland or ravines.

73. **Spodiopogon** Trin. 油芒属 (Yu Mang Shu)

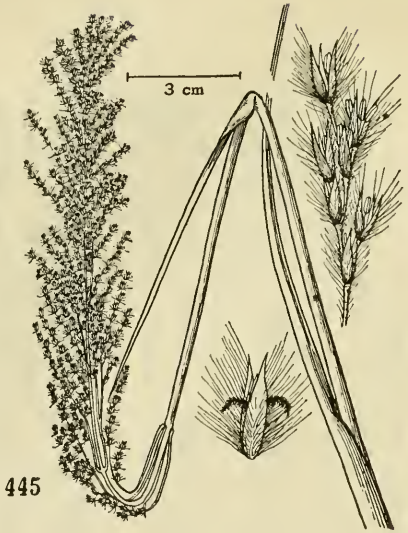
Perennials with open terminal panicles: spikelets more or less terete, all perfect, binate, or 3-nate at the terminal rachis joint; unequally pedicelled, or one of them sessile; in *peduncled* slender *racemes* on a 1-*several-jointed rachis*, awned from the sinus of the 2-cleft fertile lemma. About 10 species, in Asia; 6 in China. (Greek: *spodios*, ash colored, and *pogon*, beard, alluding to the grayish hirsute spikelets of the type species, *S. sibiricus* Trin.)

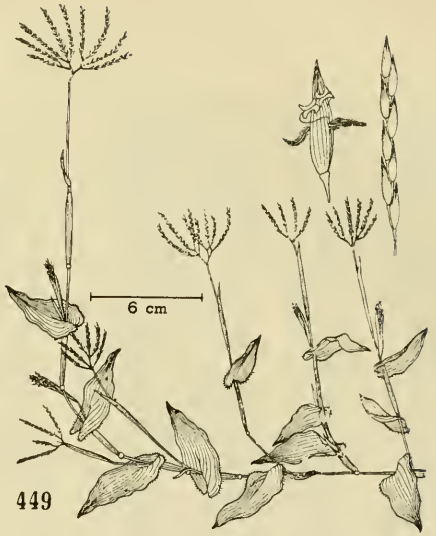
Key to the Species

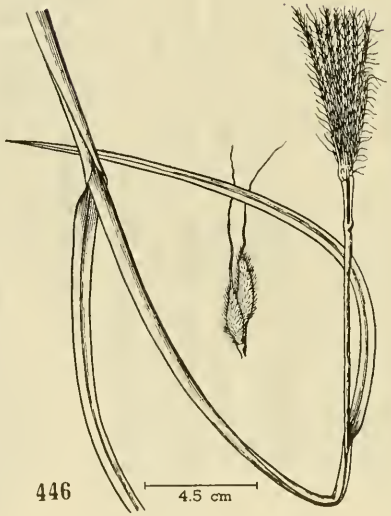
Spikelets 2-fld.; one of the pair pedicelled; the other sessile: racemes 2–4-jointed; joints and pedicels villous ..... 1. *S. sibiricus*

Spikelets 1-fld.; both of the pair pedicelled: racemes many-jointed; joints and pedicels glabrous ..... 2. *S. cotulifer*

1. **Spodiopogon sibiricus** Trin. 大油芒 (Ta Yu Mang; Great-oily-awn) (Mak.F.823).







445. Saccharum arundinaceum
446. Eulalia speciosa

447. Microstegium nudum
448. Ischaemum imbricatum

449. Arthraxon hispidus
450. Hemarthria altissima

Culms 0.7–1.5 m. high; fls. VIII; fr. IX. Temperate Asia; locally in An., Che., Ki., Ku. Grassy hills and shady thickets.

2. **Spodiopogon cotulifer** (Thunb.) Hack. 油芒 (Yu Mang; Oily-awn) (L.S.J.7:235). Culms 1.0–2.5 m. high; fls. VIII; fr. IX. North India to eastern Asia; locally in Che., Ku. Waste ground, hillsides, grassland.

74. **Eulalia** Kunth 金茅属 (Chin Mao Shu; Golden-grass Genus)

Perennials (ours) with *two to several digitate or approximate racemes*: spikelets binate; one sessile, the other pedicelled; all alike and perfect, on an *articulate rachis*, usually awned from the dilated base of the upper lemma. About 25 species, in tropical and temperate parts of the Old World; 6 in China. (Named for Eulalie Delile, wife of A.R. Delile (1788–1850), professor of botany at Montpellier, France. She made the drawings for Kunth's "Distribution methodique de la famille des Graminées," 1835.)

Key to the Species

Basal sheaths of the culm woolly at the base with yellowish-brown hairs ..... 1. *E. speciosa*
Basal sheaths of the culm glabrous at the base ..... 2. *E. quadrinervis*

1. **Eulalia speciosa** (Debeaux) Ktze. (L.S.J.7:233). Culms 0.8–1.7 m. high; fls. VII; fr. VIII. Northern India to eastern Asia; locally in An., Che., Ki., Ku. Dry slopes and grassy hills. Fig. 446.
2. **Eulalia quadrinervis** (Hack.) Ktze. (L.S.J.7:233). Culms 30–100 cm. high; fls. X; fr. XI. India to eastern Asia and the Philippines; locally in Che., Ku. Dry slopes and grassy hills.

75. **Microstegium** Nees 小苞草属 (Hsiao Pao Ts'ao Shu)

Resembling *Eulalia* in the digitate racemes and in the binate spikelets, but differing in the *straggling habit* with *lanceolate* or ovate-lanceolate *blades*. About 30 species, in tropical and temperate parts of the Old World; 6 in China. (Greek: *micros*, small, and *stege*, a roof or covering, alluding to the lemmas being shorter than the glumes.)

Key to the Species

Spikelets 4–6 mm. long; the awns twisted, 5–8 mm. long, or sometimes wanting ..... 1. *M. vimineum*
Spikelets 3–4 mm. long; the awns capillary, 10–15 mm. long ..... 2. *M. nudum*

1. **Microstegium vimineum** (Trin.) A. Camus (Hitch.748). Culms 0.5–1.0 m. high; fls. IX; fr. X. Northern India to eastern Asia and the Philippines; locally in An., Che., Ku. Moist or shady ground.
2. **Microstegium nudum** (Trin.) A. Camus (L.S.J.7:233). Culms 20–60 cm. high; fls. IX; fr. X. India to eastern Asia and Malaysia; locally in Che., Ku. Moist or shady ground. Fig. 447.

76. **Pogonatherum** Beauv. 金髮草属 (Chin Fa Ts'ao Shu)

Rather low and slender perennials with terminal *solitary spike like racemes*: spikelets binate; one sessile and perfect; the other (smaller) pedicelled and pistillate; both 2-awned, imbricate on slender *jointed rachis*. Three species, in tropical or

subtropical Asia and Australia; 2 in China. (Greek: *pogon*, beard, and *antheros*, awn or stiff bristle, alluding to the bearded and awned racemes.

Key to the Species

Sessile spikelets 2.5–3.0 mm. long; the lower floret present; second glume a little longer than the first: stamens 2 ..... 1. *P. paniceum*
Sessile spikelets 2 mm. long; the lower floret wanting; second glume evidently longer than the first: stamens 1, rarely 2 ..... 2. *P. crinitum*

1. **Pogonatherum paniceum** (Lam.) Hack. (L.S.J.7:235). Culms 30–60 cm. high; fls. IV; fr. V. Tropical Asia and Australia, and southeastern China; locally in Che. Cliffs or grassy roadsides.
2. **Pogonatherum crinitum** (Thunb.) Kunth 金髮草 (Chin Fa Ts'ao; Golden-hair Grass) (A.A.J.31:131). Culms 15–30 cm. high; fls. and fr. V–IX. India to eastern Asia; locally in An., Che., Ki. Fields, roadsides and moist ground.

77. **Ischaemum** Linn. 鴨嘴草属 (Ya Tsui Ts'ao Shu; Duck-bill-grass Genus)

Perennials (ours) with usually binate appressed racemes: spikelets binate; one sessile and perfect, usually awned; the other pedicelled, staminate or perfect, but not always fruitful: rachis *joints and pedicels triquetrous*, confluent at the base into U-shaped structures. About 50 species, in southern Asia and Australia, a few in America and Africa; 8 in China. (Greek: *ischo*, to press back, and *aima*, blood; the meaning uncertain.)

Key to the Species

First glume of sessile spikelets transversely rugose with 2–4 marginal nodules or ridges ..... 1. *I. imbricatum*
First glume of sessile spikelets not transversely rugose.
Sessile spikelets geniculately awned; axterior angles of joints and pedicels long-ciliate ..... 2. *I. hondae*
Sessile spikelets awnless or shortly awned; exterior angles of joints and pedicels serrulate-scabrous ..... 3. *I. crassipes*

1. **Ischaemum imbricatum** (Hack.) Stapf ex Ridley (Rid.F.5:200). Culms 30–120 cm. high; fls. and fr. VI–X. India to eastern Asia and the Philippines; locally in Che., Ki., Ku. Open moist ravines and grassland. Fig. 448.
2. **Ischaemum hondae** Matsuda (Bo.Ma.T.27:106). Culms 45–90 cm. high; fls. VII; fr. VIII. Confined to China; locally in An., Che., Ki., Ku. Open valleys or moist grassland.
3. **Ischaemum crassipes** (Steud.) Thell. (Mak.F.828). Culms 40–80 cm. high; fls. VII; fr. VIII. Eastern Asia; locally in Che., Ku. Ditches and river banks.

78. **Arthraxon** Beauv. 蓑草属 (Chin Ts'ao Shu; Loyal-grass Genus)

Perennials or annuals with clasping cordate blades and digitate or fascicled racemes: spikelets binate; one sessile and perfect, usually awned; the other when present neuter or rarely staminate, or often abortive with *minute pedicels* at base of sessile ones. About 10 species, in tropical and temperate zones; 3 in China. (Greek: *arthron*, joint, and *axon*, axis, alluding to the fragile jointed rachis.)

Key to the Species

Perennial: spikelets binate: stamens 3 ..... 1. *A. lanceolatus*

Annual: spikelets solitary through the suppression of the pedicelled ones: stamens 2 ..... 2. *A. hispidus*

1. **Arthraxon lanceolatus** (Roxb.) Hochst. 莠竹 (Yu Chu; Weed Bamboo) (H.F.7:143). Culms 30–90 cm. high; fls. VII; fr. VIII; perennial. India to eastern Asia and Abyssinia; locally in An., Ku. Open slopes or sandy moist ground.
2. **Arthraxon hispidus** (Thunb.) Mak. (Hitch.748). Culms 20–60 cm. high; fls. and fr. V–X; annual. Tropical and temperate parts of the Old World; locally in An., Ki., Ku. Open moist ground, shaded. Fig. 449.

79. **Phacelurus** Griseb. 聚尾草属 (Chü Wei Ts'ao Shu)

Perennials with rigid glabrous *corymbose digitate* rarely solitary *racemes*: *spikelets* binate, *awnless*, all alike or the pedicelled ones rarely laterally compressed; rachis joints and pedicels stout, triquetrous. 4 species, in Asia and Africa; one in China. (Greek: *phakelos*, a fascicle, and *oura*, tail, alluding to the fascicled racemes.)

1. **Phacelurus latifolius** (Steud.) Ohwi (*Rottboellia latifolia* Steud.; *Manisuris latifolia* (Steud.) Kuntze) (Mak.F. 827). Culms up to 1 m. or more; fls. and fr. VI–IX. China, Korea, Japan and southward to Java; locally in Che., Ku. Beaches and river banks.

1a. **Phacelurus latifolius** var. **angustifolius** (Debeaux) Keng. Differs from the species in having solitary or 2–4 racemes and narrower blades, 2–5 mm. wide. Locally in Che., Ku.

80. **Hemarthria** R. Br. 俭草属 (Chien Ts'ao Shu; Economical-grass Genus)

Perennials with somewhat compressed solitary racemes: *spikelets* binate, *awnless*; one sessile and perfect, the other pedicelled and staminate or perfect; sessile spikelets sunken in the excavations of the somewhat *tenacious rachis* formed by the union of the joints and pedicels. About 8 species, throughout the warm regions of the Old World; 2 in China. (Greek: *hemi*, half, and *arthron*, joint, alluding to the jointed but tenacious rachis.)

1. **Hemarthria altissima** (Poir.) Stapf & C.E. Hubb. (*Rottboellia compressa* Linn. f. var. *fasciculata* (Lam.) Hack.) (H.F. 7: 153; K.B. 1934: 109). Culms 60–90 cm.; fls. VII; fr. VIII. Temperate Eurasia and southern Africa; locally in An., Che., Ku. Open moist ground. Fig. 450.

81. **Rottboellia** Linn. f. 羅氏草属 (Lo Shih Ts'ao Shu; Rottboell's-grass Genus)

Annuals (ours) with stout terete solitary racemes: *spikelets* binate, *awnless* the sessile perfect, sunken in the cavities of the thickened *fragile rachis*; the pedicelled staminate or rudimentary, with pedicels free from or closely appressed to the joints. About 15 species, chiefly pantropic; 3 in China. (After C. F. Rottboell, a Danish botanist.)

1. **Rottboellia laevispica** Keng (Wash. J. 21: 157). Culms about 1 m. high; fls. VIII; fr. IX. Southeastern China; locally in Ku. Shady woods.

82. **Hackelochloa** Ktze. 海克草属 (Ha K'ê Ts'ao Shu)

Freely branching annuals with flat blades and numerous short solitary racemes;

spikelets awnless, in pairs; the rachis joint and pedicel adnate, clasped between the edges of the *globose* alveolate first glume of the *sessile spikelet*; *pedicelled spikelet conspicuous*, staminate; 2 species; 1 in China. (After Prof. Eduard Hackel, 1850–1926, noted Austrian agrostologist.)

1. **Hackelochloa granularis** (L.) Ktze. (Hitch. 788). Annual, coarsely hispid; culms 3–10 dm. high; fls. X, racemes terminal and axillary, 1–2 cm. long; fr. X–XI. Most tropical countries; locally in An. Grassy slopes.

83. **Eremochloa** Buse 蜈蚣草属 (Wu Kung Ts'ao Shu)

Slender perennials with solitary compressed spike-like racemes: spikelets solitary at each node; the pedicelled ones reduced to glume-like or stipiform structures; *sessile spikelets* dorsally compressed, *awnless*, imbricate along one side of, but *not sunken* in the slender jointed rachis. About 10 species, in tropical and temperate Asia; 3 in China. (Greek: *eremo*, desert, and *chloa*, grass, alluding to the habitat of the type species, *E. horneri* Buse.)

1. **Eremochloa ophiuroides** Hack. 蜈蚣草 (Wu Kung Ts'ao; Centipede Grass) (Hitch. 787). Culms stoloniferous, 15–30 cm. high; fls. and fr. VII–IX. Southeastern China to Formosa; locally in An., Che., Ki., Ku. Moist grassland.

84. **Bothriochloa** Ktze. 孔纹草属 (K'ung Wên Ts'ao Shu; Pit-marked-grass Genus)

Perennials with (*paniculate to*) *corymbose-digitate racemes*: *spikelets* binate; the sessile perfect, *awned*; the pedicelled staminate, awnless: *rachis joints and pedicels slender*, longitudinally grooved between the thickened margins. About 25 species, mostly in tropical Asia; 3 in China. (Greek: *bothros*, a pit, and *chloa*, grass, alluding to the pitted first glumes of the type species, *B. anamitica* Ktze.)

1. **Bothriochloa ischaemum** (L.) Keng (*Andropogon ischaemum* Linn.) (H.F. 7: 171). Culms 30–90 cm. high; fls. and fr. V–X. Tropical and temperate Asia; locally in An., Ku. Grassy slopes and waste places. Fig. 451.

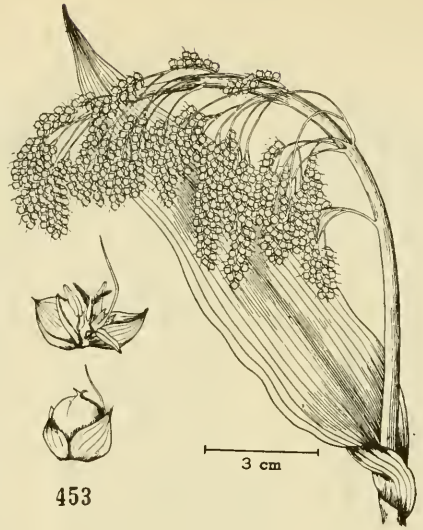
85. **Capillipedium** Stapf 細柄草属 (Hsi Ping Ts'ao Shu; Slender-pedicel-grass Genus)

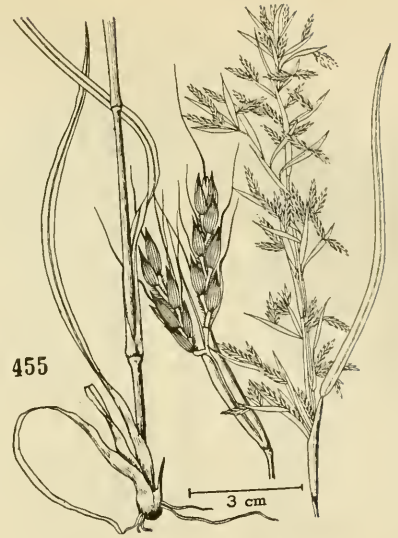
Perennials with open panicles of 1–5 (rarely up to 8) *jointed racemes*: spikelets binate, or ternate at the terminal joint of the rachis: *joints and pedicels* filiform, *longitudinally grooved*. 6 species, in tropical and temperate zones of the Old World; 2 in China. (Latin: *capillus*, a hair, and *pes* (*pedis*), a foot, alluding to the filiform pedicels.)

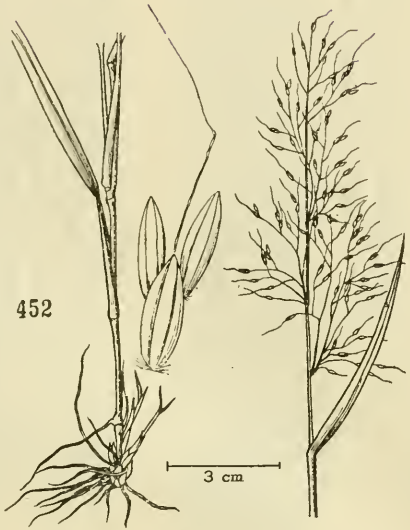
Key to the Species

Culms erect, simple or sparingly branched; the brs. appressed to the culm: blades linear, not glaucous: pedicelled spikelets mostly similar to or smaller than the sessile ones ..... 1. *C. parviflorum*

Culms more or less decumbent at the base, freely brg.; the brs. spreading widely from the culm: blades sublanceolate, glaucous: pedi-







451. Bothriochloa ischaemum
452. Capillipedium parviflorum

453. Sorghum vulgare
454. Schizachyrium brevifolium

455. Cymbopogon tortilis
456. Heteropogon contortus

celled spikelets (especially the terminal ones) 1/3–2 times longer than the sessile ones ..... 2. *C. glaucopsis*

1. **Capillipedium parviflorum** (R. Br.) Stapf (*Andropogon micranthus* Kunth) (L.S.J. 7: 244). Culms 40–120 cm. high; fls. and fr. VII–X. Old World tropics; locally in An., Che., Ku. Thickets and grassy slopes. Fig. 452.
2. **Capillipedium glaucopsis** (Steud.) Stapf (H.I.t. 3085). Culms suffruticose at base, 60–100 cm. high; fls. and fr. VII–X. India to eastern Asia and Malaysia; locally in Che. Grassy slopes.

86. **Sorghum** Pers. 高粱属 (Kao Liang Shu)

Tall or moderately tall perennials or annuals with large open panicles of numerous 1–5-jointed racemes: spikelets binate, or ternate at the terminal joint of the rachis; the sessile perfect, awned or awnless; the pedicelled staminate or neuter, awnless: *joints and pedicels* slender, ciliate, *never longitudinally grooved*. About 35 species, in tropical and subtropical zones; 3 in China. (Named for *Sorgho*, the Italian name of the plant.)

Key to the Species

Perennial: panicle brs. simple; hairs of the infl. brown ..... 1. *S. nitidum*
Annual: panicle brs. compound or brg.; hairs of the infl. white .... 2. *S. vulgare*

1. **Sorghum nitidum** (Vahl) Pers. (L.S.J. 6: 248). Culms 60–150 cm. high; fls. VIII; fr. IX. India to eastern Asia and Malaysia; locally in Ki., Ku. Grassy slopes.
2. **Sorghum vulgare** Pers. 高粱 (Kao Liang; Tall Millet) (Hitch. 773). Culms 1–4 m. high; fls. VIII; fr. IX. Cultivated in warm countries; locally in An., Ku. Cultivated fields. Fig. 453.

87. **Schizachyrium** Nees 裂稃草属 (Lieh Fu Ts'ao Shu)

Low annuals (ours) with slender culms and spatheate infl. of *solitary racemes*: spikelets binate; the sessile perfect, awned; the pedicelled reduced to awned glumes: joints and pedicels usually thickened upwards with scarious cupular or toothed appendages at the apex. About 50 species, pantropic; 3 in China. (Greek: *schizo*, to split, and *achyron*, chaff, alluding to the bipartite fertile lemma.)

1. **Schizachyrium brevifolium** (Sw.) Nees (*Andropogon brevifolius* Sw.) 裂稃草 (Lieh Fu Ts'ao; Broken-lemma Grass) (L.S.J. 7: 243). Culms 20–60 cm. high; fls. IX; fr. X. Tropical and subtropical regions; locally in An., Che., Ku. Moist shady places or rocky slopes. Fig. 454.

88. **Cymbopogon** Spreng. Oilgrass 香茅属 (Hsiang Mao Shu; Fragrant-grass Genus

Mostly aromatic perennials with spatheaceous infl. of *binate racemes*: each pair of racemes subtended by an inflated boat-shaped spathe: spikelets binate; the lowest *pair* in one of the binate racemes *homogamous* (both awnless, staminate, or neuter.) About 30 species, in tropical and temperate zones of the Old World; 5 in China. (Greek: *kumbe*, boat, and *pogon*, beard, alluding to the boat-shaped spathes.)

1. **Cymbopogon tortilis** (Presl) Hitch. (L.S.J. 7: 246). Culms 50–120 cm. high; fls.

VIII; fr. IX. Eastern Asia; locally in An., Che., Ki., Ku. Grassy slopes. Fig. 455.

"*Cymbopogon nardus* (L.) Rendle, Citronella Grass, is far more robust, the spikelets always or nearly always abortive. Those trying to grow oilgrasses in Puerto Rico and elsewhere say it never sets seed. It is planted from dividing the clumps. Hitchcock 18498, 18500, Purple Mountain; Steward 2573, Tso 1622, 2279, Kiangsu, R.C. Ching 4645, Kweichow; Chiao 1967, Griffing and Steward 998, some originally named "*C. nardus*" are not *nardus*, the oilgrass. Mdle. Camus later referred *C. hamatulus* to *C. tortilis* (Presl) A. Camus. Hackel (p. 606) refers both to *A.* (*andropogon*) *nardus* var. h. *hamatulus*. The valid name as a species is *C. tortilis* (Presl) A. Camus."—Agnes Chase.

89. **Heteropogon** Pers. 黃茅属 (Huang Mao Shu)

Perennials (ours) with *solitary* spikelike *racemes*: spikelets binate; the lower 3–10 *pairs homogamous*, imbricate and long-persistent along the glabrous tenacious rachis; the remaining pairs heterogamous; one sessile, *pistillate* or perfect, *terete*, long-awned, obliquely disarticulating with pungent rufous-bearded callus; the other pedicelled, staminate or neuter, flat, awnless. 8 species, in tropical and subtropical zones; 2 in China. (Greek: *heteros*, different, and *pogon*, beard, alluding to the differences between the awnless staminate and awned pistillate spikelets.)

1. **Heteropogon contortus** (L.) Beauv. 黃茅 (Huang Mao; Yellow Grass) (Hitch. 779). Culms 45–90 cm. high; fls. and fr. VI–X. Warm regions; locally in Che. Grassy slopes and rocky hills. Fig. 456.

90. **Themeda** Forsk. 菅属 (Chien Shu)

Perennials with spatheate infl. of *solitary racemes*: spikelets binate, or the terminal joint ternate; the lowermost *two pairs homogamous*, closely *approximate*; the remaining 1–3 pairs heterogamous; one sessile and perfect, *terete*, usually awned, obliquely disarticulating with pungent rufous-bearded callus; the other pedicelled, staminate or neuter, awnless. About 20 species, mostly in tropical and subtropical parts of the Old World; 6 in China. (Named from *Thaemed*, an Arabic name of the plant.)

1. **Themeda triandra** Forsk. 菅 (Chien; Grass Stalk) (L.S.J. 7: 251). Culms 30–150 cm. high; fls. and fr. VI–X. Tropical and temperate parts of the Old World; locally in An., Che., Ki., Ku. Grassy hills. Fig. 457.

Tribe XIV. **Maydeae** 玉蜀黍族 (Yü Shu Ch'u Ts'u)

Spikelets resembling those of *Andropogoneae* in structure and arrangement, but *all unisexual*: glumes thick or membraanceous; lemma and palea hyaline, awnless: rather tall monoecious plants; the *staminate and pistillate spikelets very dissimilar*, either on different parts of the same infl. or in separate infls.

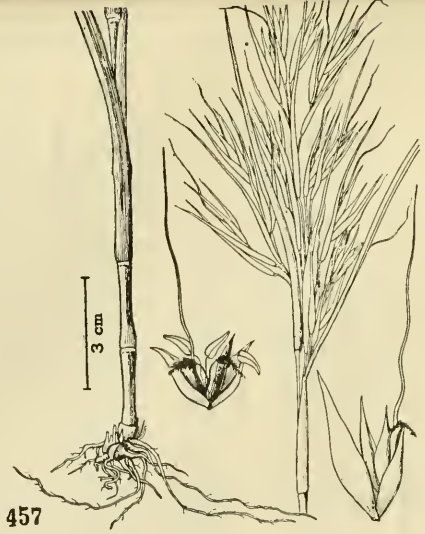
Key to the Genera

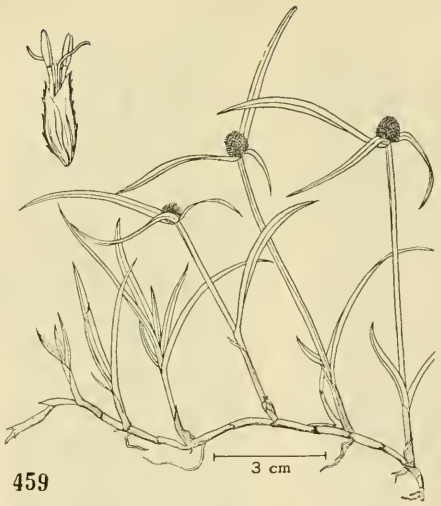
Staminate spikelets in the upper, pistillate in the lower part of the same spikelike racemes ..... 91. *Coix*

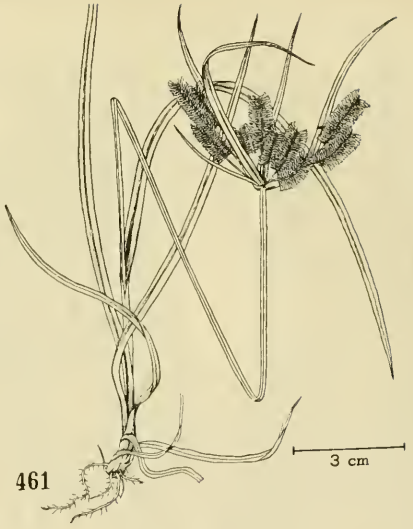
Staminate and pistillate spikelets in separate infls.; the staminate in a terminal panicle or tassel; the pistillate in axillary sheathed spikes or ears ..... 92. *Zea*

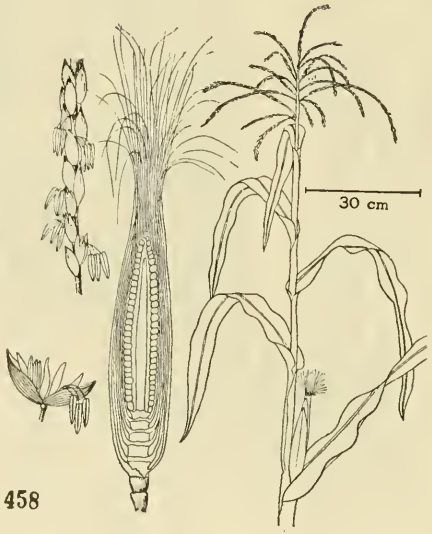
91. **Coix** Linn. 薏苡属 (I I Shu)

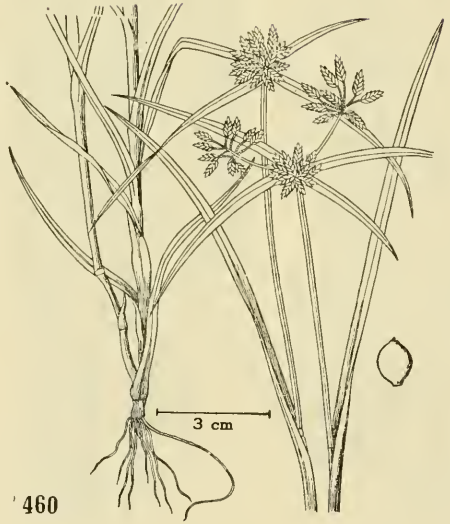
Coarse stout monoecious annuals with infl. of *staminate spikes protruding from*

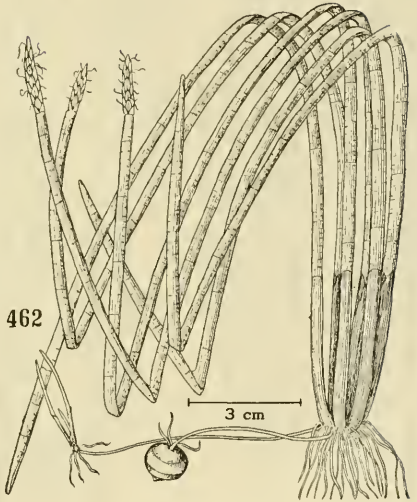












457. Themeda triandra
458. Zea mays

459. Kyllinga
460. Cyperus compressus

461. Mariscus sieberi
462. Eleocharis dulcis

the orifice of the bony *involucre of the pistillate spikelets*; staminate spikelets 2–3-nate; one sessile; the other 1–2-pedicelled, on a slender continuous rachis forming a short spike; pistillate spikelets 2–3 together; one fertile; the other 1–2 rudimentary, enclosed in a bony bead-like involucre (morphologically a subtending leaf-sheath). About 10 species, mostly in tropical Asia; one in China. (Greek: *koix*, a kind of palm, applied by Linnaeus to this plant.)

1. **Coix lacryma-jobi** Linn. Job's Tears 薏苡 (I I) (Hitch. 790). Culms 1.0–1.5 m. high; fls. and fr. VII–X. Tropical and temperate countries; locally in An., Che., Ku. Moist ground, waste places and cultivated.

92. **Zea** Linn. 玉蜀黍属 (Yü Shu Ch'u Shu)

Tall monoecious annuals with *male infl. in a terminal panicle or tassel* of several to many racemose spikes; and *female infl. in a sheathed axillary ear* with long styles protruding from the top of it as a silky mass of threads: staminate spikelets binate at each node of a continuous rachis; one sessile, the other pedicelled; pistillate spikelets sessile, densely crowded in many vertical series on a cylindric spongy rachis. One species, widely cultivated. (Greek: *zea* or *zeia*, a kind of grain.)

1. **Zea mays** Linn. Corn. Maize 玉蜀黍 (Yü Shu Ch'u; White Jade Millet) (Hitch. 794). Culms 1–4 m. high; fls. VIII; fr. IX. Cultivated throughout tropical and temperate zones; locally in An., Che., Ki., Ku., Hun., Hup., Hon. Cultivated fields. Fig. 458.

179. **CYPERACEAE** Sedge Family 莎草科 (So Ts'ao K'o)

Grass-like or rush-like herbs with fibrous roots and mostly *solid* jointed *3-angled stems*: stem *lvs.*, when present, *3-ranked, with closed sheaths*: fls. small, in spikelets; each fl. in the axil of a glume-like imbricated bract: perianth none, or of bristles or scales; stamens 2 or 3; *anthers basifixed*: *fr. an achene.* 75 genera with over 3,000 species, in all parts of the world; 25 genera and 335 species in China. Complete and fully mature specimens will be required for the study of this difficult family.

Key to the Genera

A. Fls. unisexual; plants monoecious.
  Achene enclosed in a sac (perigynium): fls. several to many in the fertile spikelets ..... 1. *Carex*
  Achene borne on a scale, not enclosed: fls. few in each spikelet .. 2. *Scleria*
AA. Fls. bisexual.
  B. Flg. scales many (except in *Kyllinga*).
    C. Scales of the spikelets in two ranks (distichous): fls. without hypogynous bristles: achenes not beaked.
      D. Spikelets of 3 or 4 scales, crowded into dense heads .... 3. *Kyllinga*
      DD. Spikelets of many scales, variously clustered, but not in heads.
        Style 2-parted ..... 4. *Pycreus*
        Style 3-parted.
          Rachilla of the spikelet persistent..... 5. *Cyperus*
          Rachilla of the spikelet deciduous..... 6. *Mariscus*
    CC. Scales of the spikelets spirally arranged.
      E. Style-base constricted or jointed above the achene.

Hypogynous bristles present: usually without lvs., except bracts of the infl.: plants glabrous ..... 7. *Eleocharis*
Hypogynous bristles none.
Style-base persistent, or if deciduous not leaving a tumor on the achene: plant glabrous or pubescent 8. *Fimbristylis*
Style-base deciduous, leaving a tumor on the achene: lvs. long-hairy at the top of the sheath ..... 9. *Bulbostylis*
EE. Style-base tapering gradually to the achene.
Achene enclosed by two hyaline hypogynous scales; flg. scales with spreading tips ..... 10. *Lipocarpha*
Achene not enclosed by hypogynous scales: linear hypogynous bristles 0–6; tips of the flg. scales not spreading ..... 11. *Scirpus*
BB. Flg. scales one or two, with empty ones above and below: style 2-parted; base thickened, forming a tubercle or beak on the achene ..... 12. *Rhynchospora*

1. **Carex** Linn. Sedge 薹屬 (T'ai Shu)

Perennials; grasslike: spikes in the axils of leafy or scale-like bracts: *flowers unisexual*: stamens 3 in the staminate fl.: the pistillate fl. consisting of a single pistil; *ovary enclosed in a sac* (perigynium) borne in the axil of a bract or scale. 8,000 to 9,000 species, of wide distribution, mostly outside the tropics; 150 species in China. The Latin name, probably derived from the Greek, *keirein*, to cut.)

Key to the Species

a. Styles 2-parted.
b. Terminal spikes partly staminate and partly pistillate.
c. The terminal spikes pistillate at the base, and staminate above.
Spikes slender, laxly arranged ..... 1. *C. brunnea*
Spikes closely set or crowded: infl. compound, 4–5 × 1 cm., of 8–10 short spikes..... 2. *C. fluviatilis* var. *unisexualis*
cc. The terminal spikes staminate at the base, and pistillate above.
Spikes densely cylindric, slenderly pedicellate, 30–40 × 4–6 mm. ..... 3. *C. cernua*
Spikes ellipsoid, sessile, 8–12 × 3–4 mm. ..... 4. *C. remota*
bb. The terminal spike staminate, the lateral pistillate ..... 5. *C. forsicula* var. *melinacra*

aa. Styles 3-parted.
d. Spikes solitary and terminal.
Spikes bisexual; staminate fls. above the pistillate (*Primocarex*)..... 6. *C. rara* ssp. *capillacea*
Spikes unisexual, large (pistillate, 4–6 × 3–4 cm.; staminate, 3 × 1 cm.) ..... 7. *C. macrocephala*
dd. Spikes more than one on a peduncle.
e. Spikes sessile and bisexual; staminate fls. below the pistillate ..... 8. *C. gibba*
ee. Spikes pedunculate, mostly unisexual.
f. Beak of the utricle usually short, not noticeably cleft. Sheath of the infl. short (about 5 mm. long)..... 9. *C. breviculmis*

Sheath of the infl. long (10–30 mm. long).
Bracts of the spikes short-leaf-like ..... 10. *C. foraminata*
Bracts of the spikes brownish with hyaline margins 11. *C. lanceolata*
ff. Beak of the utricle usually long, notched or cleft.
g. Utricle glabrous.
h. Flg. bracts herbaceous or chartaceous, not hyaline (*Tumideae*).
Utricles ovoid, 2 mm. broad: rhizomes caespitose.
Spikes 1–2 cm. long; utricles dark-colored at maturity ..... 12. *C. brownii* var. *transversa*
Spikes 3–5 cm. long; utricles green at maturity ..... 13. *C. ichnostachya*
Utricles cylindric, 1 mm. across: rhizomes stoloniferous ..... 14. *C. japonica* var. *chlorostachys*
hh. Pistillate flg. bracts hyaline, long-aristate.... 15. *C. scabrifolia*
gg. Utricle more or less pubescent.
i. Culms with nodes and lvs. throughout their length, or lvs. exceeding the culms.
Scale shorter than the utricle.
Scale of utricle ovate, with narrow hyaline margin and short bristle-tip..... 16. *C. hebecarpa* var. *ligulata*
Scale of utricle lanceolate, hyaline, slenderly pointed..... 17. *C. idzuroei*
Scale longer than the utricle, lanceolate, with broad hyaline margin and long bristle-tip equal to or exceeding length of scale..... 18. *C. nemostachys*
ii. Culms longer than the lvs. and leafless above: scale of utricle broad-lanceolate, hyaline, with stout midrib extended into bristle-tip half the length of the scale ..... 19. *C. laticeps*

1. **Carex brunnea** Thunb. 束草 (Shu Ts'ao; Bunch Grass) (Mak. F. 794). Erect, 2–4 dm. high; fls. brown, IX; fr. brown, X. Eastern Asia to Australia; locally in Che., Ki., Ku. Moist thickets.
2. **Carex fluviatilis** Boott var. **unisexualis** (C.B. Clarke) Kükenth. (E.P. 38 (IV. 20): 144). Eastern and Central China; locally in Ki., Ku.
3. **Carex cernua** Boott (H.F. 6: 708). Coarse, erect, 3–6 dm. high; fls. green, IV–V; fr. brownish, V–VI. Southeastern Asia; locally in Che., Ku. Wet ground.
4. **Carex remota** Linn. 書帶草 (Shu Tai Ts'ao; Book-mark Grass) (E. P. 38 (IV. 20): 233, f. 37G–H). Decumbent, grass-like, 2–4 dm. high; fls. greenish, VI; lowest bract long, overtopping infl. North temperate regions; locally in An., Ku. Woodland.
5. **Carex forsicula** Franch. & Savat. var. **melinacra** (Franch.) Kükenth. (E.P. 38 (IV. 20): 342). Culms 30–60 cm. high. China, Korea, Japan; locally in An.

6. **Carex rara** Boott ssp. **capillacea** (Boott) Kükenth. (Mak. F. 781). Culms 20–40 cm. high. China, Korea, Japan; locally in Ku.
7. **Carex macrocephala** Spreng. 薹草 (Ssŭ Ts'ao) (Mak.F. 783). Stout, erect, 15–20 cm. high; fr. brown, VIII. Eastern China and Japan to Alaska and Oregon; locally in Che. Sandy shores.
8. **Carex gibba** Wahlenb. 穹隆薹 (Ch'iung Lung T'ai; Eminent Carex) (Mak.F. 784). Grasslike, 6 dm. high; fr. green, V. China and Japan; locally in Che., Ku. Woodland.
9. **Carex breviculmis** R. Br. 短莖薹 (Tuan Ching T'ai; Short-stemmed Carex) (Mak. F. 788–9). Weak, narrow-lvd., grass-like, 2 dm. high; fls. green, V; fr. brown, X. Eastern Asia to Australia; locally in Che., Ki., Ku. Woodland.
10. **Carex foraminata** C. B. Clarke (F.H.E. 3: 285). Tufted, to 40 cm. high. Central China; locally in Che., Ki.
11. **Carex lanceolata** Boott (E.P. 38 (IV. 20): 493). Tufted, 15–20 cm. high; fls. III; fr. IV–V. Eastern Asia; locally in Ku. Brushland.
12. **Carex brownii** Tuckerm. var. **transversa** (Boott) Kükenth. 柔管 (Jou Kuan; Soft Tube) (E.P. 38 (IV. 20): 614). Grass-like, 4–6 dm. high; fls. light brown, III. China, Korea, Japan; locally in Che., Ku. Swampy ground.
13. **Carex ichnostachya** Steud. 珠蕙管 (Chu Huei Kuan; Pearl-orchid-tube) (Mak. F. 795). Slender, 1 m. high; fr. VI. China, Korea, Japan; locally in Ku.
14. **Carex japonica** Thunb. var. **chlorostachya** (Don) Kükenth. 籤草 (Ch'ien Ts'ao; Bamboo tally-stick Grass) (E.P. 38 (IV. 20): 620). Stout, 5 cm. high; fls. and fr. green, V–VII; terminal spike staminate. Eastern Asia; locally in Ki., Ku. Woodland shade.
15. **Carex scabrifolia** Steud. 鹹蕢 (Hsien K'uei; Salt-basket Plant) (Mak.F. 799). Culms 30–60 cm. high. China, Korea, Japan; locally in Ku.
16. **Carex hebecarpa** C.A.Mey. var. **ligulata** (Nees) Kükenth. (E.P. 38 (IV. 20): 745). Erect, broad-lfd., 4–6 dm. high; fr. reddish brown, VIII; utricle densely pubescent. Southeastern Asia; locally in Che., Ku.
17. **Carex idzuroei** Franch. et Savat. (E. P. 38 (IV. 20): 708, f. 121 C–E). Culms 20–60 cm. high; fls. IV; lower sheaths purple. Eastern Asia; locally in An. Moist banks.
18. **Carex nemostachys** Steud. (H.F. 6: 746). Culms 5 dm. high; fls. IV; fr. V–VII. Eastern Asia; locally in Che., Ki., Ku. Woodland shade.
19. **Carex laticeps** C. B. Clarke ex Franch. (E. P. 38 (IV. 20): 635). Tufted, 15–45 cm. high; fls. IV; fr. V; beak of utricle elongated, 2-fid. China, Korea; locally in An., Ki., Ku.

2. **Scleria** Bergius Nut Rush 小真珠茅属 (Hsiao Chên Chu Mao Shu; Small-precious-pearl-grass Genus)

Perennials with triangular leafy culms, usually tufted and from creeping rhizomes: infl. a narrow (ours) panicle, with *monoecious spikelets* in axillary clusters: stamens 1–3; style 3-cleft: *achene* globular, white, bony or enamel-like in texture, pubescent or glabrous, pitted or smooth, *partly exposed at maturity*. 150 species, in most warm countries; 15 in China. (Greek: *sclereid*, hard, referring to the bony fruits.)

Key to the Species

Culms stout: lf. blades about 1 cm. broad: achenes not pitted..... 1. *S. hebecarpa*

Culms slender: lf. blades about 5 mm. broad: achenes conspicuously pitted ..... 2. *S. tessellata*

1. **Scleria hebecarpa** Nees 真珠莎 (Chên Chu So; Precious-pearl Sedge) (Mak.F. 800). Stout, erect, to 1 m.; fls. brown, IX; fr. white, X. Eastern Asia to Australia; locally in Che., Ki. Moist places.
2. **Scleria tessellata** Willd. (M.F. 120). Slender, to 8 dm.; fls. brown, VIII–IX; fr. white, IX–X. Eastern Asia to Australia. Moist ground.

3. **Kyllinga** Rottb. 水蜈蚣属 (Shui Wu Kung Shu)

Erect, with simple stems, lfy. below, topped by 1–3 *capitate ovoid spikes*; each subtended by 3 lf. -like spreading bracts: *spikelets* numerous, compressed, bisexual, with *scales 2-ranked*; the rachilla deciduous: *style 2-branched*: achenes compressed. 30 species, tropical and subtropical, 6 in China. (In honor of Peder Kylling, a Danish botanist of the 17th century.)

1. **Kyllinga brevifolia** Rottb. 水蜈蚣 (Shui Wu Kung; Water Centipede) (Mak.F. 814). Grasslike, tufted, 1–4 dm. high; fr. green, VI–VIII: spikes capitate, ovoid. Tropical and subtropical countries; locally in An., Che., Ki., Ku. Moist ground. Fig. 459.

4. **Pycreus** Beauv. 披球草属 (P'i Ch'iu Ts'ao Shu)

Slender plants, leafless below, with leaf-like bracts subtending the infl.: spikelets compressed, not in heads; the *rachilla persistent*; the *scales 2-ranked*: *style 2-parted*: achene laterally compressed. 50 species, in warm and temperate regions; 8 in China.

Key to the Species

Scales of the spikelet not sulcate: lf. blades 1–2 mm. broad, from the base of the plant..... 1. *P. globosus*
Scales of the spikelet deeply sulcate on the sides: lf. blades 3–4 mm. broad; sheaths covering 1/3 of the culm ..... 2. *P. eragrostis*

1. **Pycreus globosus** (All.) Reichb. (Mak.F. 816). Slender, erect, 2–4 dm. tall; fr. brown, IX–X. Tropical and subtropical countries of the Old World; locally in An., Che., Ki. Moist ground.
2. **Pycreus eragrostis** (Vahl) Merr. (M.F. 108). Erect, tufted, 2–4 dm. tall; fr. brown, IX–X. Tropical and subtropical countries of the Old World; locally in Ku. Wet ground.

5. **Cyperus** Linn. Galingale 莎草属 (So Ts'ao Shu)

Erect, leafy at the base, with leaf-like bracts: infl. umbellate or capitate: spikelets compressed; the *rachilla persistent*; the *scales 2-ranked*: *style 3-parted*: achene triangular or plano-convex. Over 300 species, in all warm countries; 35 in China. (An old Greek name of the plant.)

Key to the Species

a. Spikelets digitate or in umbels.
Clusters of spikelets crowded, more or less spherical..... 1. *C. difformis*
Clusters of spikelets loose and spreading..... 2. *C. haspan*
aa. Spikelets in spikes or racemes.

b. Spikelets in dense cylindrical clusters..... 3. *C. glomeratus*
bb. Spikelets pinnately arranged.
c. Spikelets small, 4-8 mm. long, and numerous.
Scales of the spikelet obtuse, yellowish at maturity..... 4. *C. iria*
Scales of the spikelet acute, reddish at maturity ..... 5. *C. pilosus*
cc. Spikelets large, 10-25 mm. long, and fewer.
Spikelets green, 3.5-4 mm. broad: plants annual or biennial 6. *C. compressus*
Spikelets red, 2-2.5 mm. broad: plants perennial ..... 7. *C. rotundus*

1. **Cyperus difformis** Linn. 鹹草 (Hsien Ts'ao; Salty Grass) (M.F. 110). Stout, 1-4 dm. high; fr. reddish brown, IX-X. Eurasia; locally in Ki., Ku. Wet ground.
2. **Cyperus haspan** Linn. (M.F. 110). Tufted, 1-6 dm. high; fls. VIII. All warm countries; locally in Che. Rice-paddy weed.
3. **Cyperus glomeratus** Linn. (Mak.F. 819). Stout, 3-10 dm. high; fr. brown, IX-X. Eurasia; locally in An., Che., Ku. Wet ground.
4. **Cyperus iria** Linn. 荊三稜 (Ching San Lêng; Three-angled Bramble) (M.F. 111). Stout, 1-5 dm. high; fr. brown, VII-IX. Warm and temperate regions; locally in An., Che., Ki., Ku. Wet ground.
5. **Cyperus pilosus** Vahl (M.F. 111). Coarse, 4-8 dm. high; fr. brown, VIII-X. Tropical and subtropical countries of the Old World; locally in Ki., Ku. Marshy places.
6. **Cyperus compressus** Linn. 沙田草 (Sha T'ien Ts'ao; Sand Grass) (G.M. 242). Tufted, 2-5 dm. high; fls. greenish, VII; fr. VIII. Tropical regions; locally in Ku. Moist grassland. Fig. 460.
7. **Cyperus rotundus** Linn. Nut Grass 莎草 (So Ts'ao; Sedge) (Mak.F. 819). Erect, 2-5 dm. high; fls. greenish, VII; fr. VIII. Old World tropics; locally in Che., Ki., Ku. Moist meadows.

6. **Mariscus** Gaertn. 薾子苗屬 (Chuan Tzŭ Miao Shu)

Tufted, usually perennial, with mostly basal leaves and leaf-like bracts: infl. of heads or spikes in umbels: spikelets compressed; the *rachilla deciduous* above the two lowest scales; the scales 2-ranked: style 3-parted: achene triangular. 160 species, in all warm countries; 5 in China.

Key to the Species

Radii stout, not over 2 cm. long: spikes often less than 2 cm. long .. 1. *M. cyperinus*
Radii slender, to 6 cm. long: spikes 2 cm. or more long..... 2. *M. sieberianus*

1. **Mariscus cyperinus** (Retz.) Vahl (M.F. 113). Erect, stout, 2-6 dm. high; fr. brown, VI-VIII; infl. crowded. Tropical and subtropical Asia, Polynesia; locally in Che., Ku. Swampy ground.
2. **Mariscus sieberianus** Nees 薾子苗 (Chuan Tzŭ Miao) (H.F. 6: 622). Erect, slender, 2-6 dm. high; fr. brown, VI-VIII; some spikes on long radii. Warm regions; locally in Che., Ki., Ku. Swampy ground. Fig. 461.

7. **Eleocharis** R. Br. Spike Rush 蔦芋屬 (Wu Yü Shu)

Erect tufted *leafless* glabrous plants: culms simple, without nodes: infl. a single terminal spikelet with *spirally imbricated scales*, distichous in *E. acicularis*: *perianth*

usually *of* 6 (or 3-6) barbed *hypogynous bristles*: *base of the style constricted or jointed above the* lenticular or triangular *achene*. Over 100 species, cosmopolitan; 10 in China. (Greek: *elos*, a marsh, and *charis*, grace.)

Key to the Species

a. Culms capillary or slender, not septate.
  Culms capillary, 4–8 cm. high: spikelets 2–4 mm. long: achenes whitish, striate, with lengthwise ridges at the corners ..... 1. *E. acicularis*
  Culms slender, 10–50 cm. high: spikelets 5–15 mm. long: achenes gray-brown, smooth, without ridges.
    Plant very slender: spikelets ovoid, 4–7 mm. long: styles 3-fid .. 2. *E. afflata*
    Plant erect, rigid: spikelets cylindric, 10–15 mm. long: styles 2-fid. 3. *E. palustris*
aa. Culms stout, 40–60 cm. high, transversely septate; with edible tuberous corms ..... 4. *E. dulcis*

1. **Eleocharis acicularis** (L.) R. & S. 牛毛氈 (Niu Mao Chang; Cow-hair Felt) (Mak. F. 808). Mossy herb; fr. brown, VI; culms 2–8 cm. high. Eastern Asia; locally in Che., Ki., Ku. Wet ground.
2. **Eleocharis afflata** Steud. (H.F. 6: 629). Very slender, 2–4 dm. high; fr. brown, V–X. Eastern Asia; locally in Che., Ku. Wet ground.
3. **Eleocharis palustris** R. Br. 沼針蘺 (Chao Chên Lin; Water-needle Rush) (Mak.F. 809). Erect, rigid, 5–8 dm. high; fr. brown, VII–X. World-wide; locally in Che. Wet places.
4. **Eleocharis dulcis** (Burm. f.) Trin. (*E. plantaginea* R. Br.) Ground Chestnut 荸薺 (Pi Ch'i) (Mak.F. 810; M.E. 1: 119). Stout, erect, 5–7 dm. high; fr. brown, VII–XII; culms septate. Old World tropics; locally in An., Che., Ki., Ku. Cultivated in flooded terraces. Fig. 462.

8. **Fimbristylis** Vahl 飄拂草屬 (P'iao Fu Ts'ao Shu)

Tufted, with *basal lvs.* infl. various: spikelets with spirally imbricated scales: *hypogynous bristles none*: style often fringed with hairs, the base constricted or jointed above the compressed or lenticular achene. 125 species, in all warm regions; 40 in China. (Latin: *fimbria*, fringe, and *stilus*, style, referring to the fringed style.)

Key to the Species

a. Culms with only one spikelet: styles 2-parted ..... 1. *F. nutans*
aa. Culms with numerous spikelets.
  b. Styles 2-parted.
    Roots fibrous and annual ..... 2. *F. dichotoma*
    Roots from a woody rhizome ..... 3. *F. rigidula*
  bb. Styles 3-parted.
    Spikelets 5–6 mm. long and 1–2 mm. in diam., cylindric ..... 4. *F. complanata*
    Spikelets 2–3 mm. long and nearly spherical ..... 5. *F. miliacea*

1. **Fimbristylis nutans** (Retz.) Vahl 龍鬚草 (Lung Hsü Ts'ao; Dragon's-beard Grass) (Be.F. 391). Slender, 2–5 dm. high; fls. and fr. brown, VII–IX. Southeastern Asia to Australia; locally in An., Che., Ku. Wet ground.
2. **Fimbristylis dichotoma** (L.) Vahl (*F. annua* (All.) R. &. S.; *F. diphylla* Vahl) 飄拂草 (P'iao Fu Ts'ao; Waving Grass) (H.F. 6: 636; M.E. 1: 121). Erect, grass-

like, 5–8 dm. high; fr. brown, IX; style flattened, villous. Warm countries; locally in Ki., Ku. Moist ground. Fig. 463.

3. **Fimbristylis rigidula** Nees 剛飄佛草 (Kan P'iao Fu Ts'ao; Stiff Fimbristylis) (H.F. 6: 640). Stiff, erect, 3–7 dm. high; fls. and fr. brown, V–VIII. China, India, the Philippines; locally in An., Ku., Che. Grassland.
4. **Fimbristylis complanata** (Retz.) Link 嫩葉飄佛草 (Nên Yeh P'iao Fu Ts'ao; Delicate-leaved Fimbristylis) (Mak.F. 805). Grass-like, 3–5 dm. high; fls. and fr. light brown, VII–VIII. All warm countries; locally in Che., Ki. Moist ground.
5. **Fimbristylis miliacea** (L.) Vahl 日照飄佛草 (Jih Chao P'iao Fu Ts'ao; Sun-lighted Fimbristylis) (Mak.F. 807). Flexible, 1–5 dm. high; fls. and fr. brown, VIII–X. Warm countries; locally in An., Che.. Ki., Ku. Wet places.

9. **Bulbostylis** Kunth 旗茅屬 (Ch'i Mao Shu)

Tufted annuals with capillary culms and lvs.: *lvs. long-hairy at top of the sheath*: spikelets in dense terminal head-like clusters or mostly solitary on the brs. of a compound umbel: *style* 3-cleft, the *base deciduous, leaving a tumor on the achene.* (Latin: *bulbus*, bulb, and *stilus*, style.

1. **Bulbostylis barbata** (Rottb.) Kunth 旗茅 (Ch'i Mao; Flag Grass) (H.F. 6:651). Tufted, 1–3 dm. high; fr. brown, VIII–X. Warm regions of the Old World; locally in An., Che., Ki. Moist sand.

10. **Lipocarpha** R. Br. 湖瓜草屬 (Hu Kua Ts'ao Shu)

Glabrous erect tufted plants: culms lfy. at the base, each culm bearing a single cluster of a few dense spikes: spikelets 1-fld., deciduous, leaving the lower part of the axis marked with diamond-shaped scars: *flg. scales with spreading tips*: *achene enclosed by two hyaline hypogynous scales.* About 15 species, widely distributed in warm regions; 2 in China. (Greek: *lipo,* fat, and *carpha*, chaff, referring to the thick scales of some species.)

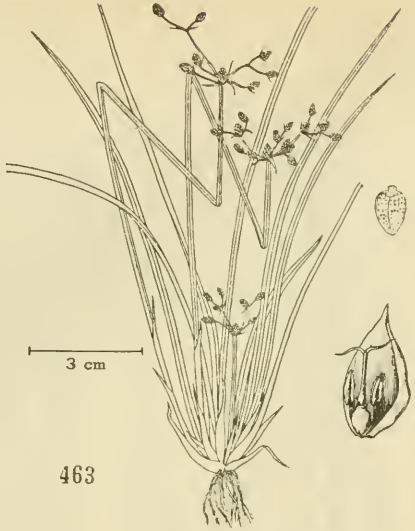
1. **Lipocarpha microcephala** (R.Br.) Kunth 湖瓜草 (Hu Kua Ts'ao; Lake-gourd Grass) (Mak.F. 804). Slender, tufted, 6–15 cm. high; fr. greenish, VIII–X; achene linear-oblong, as long as the scales. Southeastern Asia to Australia; locally in An., Che. Wet ground.

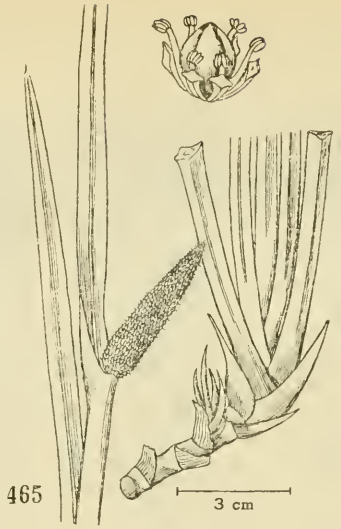
11. **Scirpus** Linn. Bulrush 莞屬 (Kuan Shu; Sedge Genus)

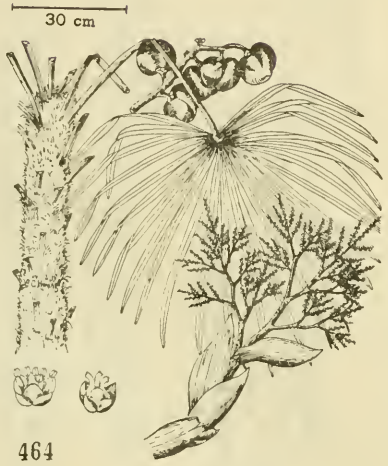
Culms sheathed at the base, glabrous: infl. in terminal corymbs or lateral heads, sometimes of a single spikelet: scales of the spikelet spirally imbricated: hypogynous bristles often present; *style not constricted or jointed at the base.* 125 species, cosmopolitan; 20 in China. (The Latin name.)

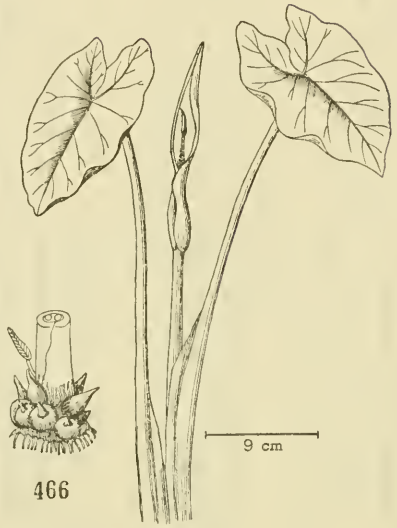
Key to the Species

a. Infl. a lateral sessile cluster of spikelets.
  Culms terete, slender..... 1. *S. erectus*
  Culms triangular, stout..... 2. *S. mucronatus*
aa. Infl. terminal or nearly so, a compound umbel-like cluster, or at least some of the spikelets pedicelled.
  b. Involucral bract one, appearing to be a continuation of the culm: culms leafless above.
    Culms slender, tufted, 15–60 cm. tall: style 3-cleft ..... 3. *S. mattfeldianus*









463. Fimbristylis dichotoma
464. Trachycarpus fortunei

465. Acorus calamus
466. Colocasia esculenta

467. Pinellia ternata
468. Lemna minor

Culms stout, 50–90 cm. tall: style 2-cleft.
Culms triangular ..... 4. *S. triqueter*
Culms terete ..... 5. *S. validus*
bb. Involucral bracts two or more, leaf-like.
c. Spikelets large (7–8 × 10–12 mm.).
Achene strongly triangular, dark brown ..... 6. *S. fluviatilis*
Achene lenticular, light brown ..... 7. *S. maritimus*
cc. Spikelets small (2–2.5 × 3–5 mm.).
Spikelets few, dark brown, in sessile clusters, subtended by conspicuous striate slender-tipped bracts..... 8. *S. filipes*
Spikelets many, cinnamon-brown, mostly in pedunculate clusters without evident bracts..... 9. *S. ternatanus*

1. **Scirpus erectus** Poir. 螢蔺 (Ying Lin; Firefly Rush) (Mak.F. 811). Coarse, rush-like, 1–10 dm. high; fr. brown, VIII–X. Eastern Asia and eastern North America; locally in An., Che., Ki., Ku. Marshes.
2. **Scirpus mucronatus** Linn. 水毛花 (Shui Mao Hua; Water Mildew) (M.F. 118). Coarse, rush-like, 4–10 dm. high; fr. brown, VII–IX. Old World; locally in An., Che., Ku. Marshes.
3. **Scirpus mattfeldianus** Kükenth. (Fe.R. 27: 108). Tufted, slender, 15–60 cm. high; fr. cinnamon-brown, IV. Eastern China; locally in An., Che. Moist rocky ground.
4. **Scirpus triqueter** Linn. 蔗草 (Piao Ts'ao; Rush) (H.F. 6: 658). Coarse, rush-like, 6–10 dm. high; fr. brown, VI–VIII. Eurasia; locally in Che., Ku. Marshes.
5. **Scirpus validus** Vahl Great Bulrush (G.M. 270). Coarse, leafless, 5–9 dm. high; fr. cinnamon-brown, VIII–X. Eastern Asia and North America; locally in Ku. Stream borders.
6. **Scirpus fluviatilis** (Torr.) A. Gray River Bulrush (G.M. 271). Coarse, leafy, 6–12 dm. high; fr. brown, VII–IX. Eastern Asia and North America; locally in Ku. Pond margins.
7. **Scirpus maritimus** Linn. 海荆三稜 (Hai Chin San Lêng; Sea Cyperus) (Mak.F. 811). Coarse, rush-like, 2–10 dm. high; fr. brown, VI–VIII. Old World; locally in Ku. Marshes.
8. **Scirpus filipes** C.B. Clarke (F.H.E. 3: 249). Erect, grass-like, 7 dm. high; fr. dark brown, IX. Eastern and central China; locally in Ki. Damp meadows.
9. **Scirpus ternatanus** Reinw. (*S. chinensis* Munro) (H.F. 6: 662). Stout, 6–10 dm. high; fr. brown, VI–VIII. Tropical Asia; locally in An., Che., Ku. Marshes.

12. **Rynchospora** Vahl Beak Rush 刺草屬 (Tz'ŭ Tz'ao Shu)

Erect tufted plants with triangular or terete culms from perennial rootstocks: lvs. narrow, mostly at the base of the plant: spikelets in irregular panicles or variously clustered, often in almost globular heads: upper fls. of the spikelet staminate, the lower perfect: style 2-cleft, or rarely entire: achene lenticular to globular, smooth or transversely wrinkled; *base of the style thickened* and persistent, *forming a tubercle or beak on the achene.* 175 species, most abundant in tropical America; 5 in China. (Greek: *rhynchos*, a snout, and *spora*, a seed, referring to the beaked achene.)

Key to the Species

Infl. a clustered panicle, the brs. often widely scattered..... 1. *R. glauca* var. *chinensis*
Infl. a dense solitary nearly globose head..... 2. *R. rubra*

1. **Rynchospora glauca** Vahl var. **chinensis** (Boeckeler) C.B. Clarke 絨刺草 (Jung Tz'ŭ Ts'ao; Woolly-thorn Grass) (H.F. 6: 672). Slender, to 9 dm.; fr. dark brown, X. Warm countries; locally in Ki. Moist ground.
2. **Rynchospora rubra** (Lour.) Mak. (M.F. 119). Slender, with lvs. at the base, 5 dm. high; fr. brown, VIII–X. Tropical and subtropical countries of the Old World; locally in Ki., Ku. Brushland.

180. PALMAE Palm Family 棕櫚科 (Tsung Lü K'o)

Mostly erect *shrubs or trees*, sometimes climbing, with *solid stems* and alternate *palm-like lvs.*: lvs. palmate or pinnate, with sheathing petioles: infl. in many-fld. panicles or spikes from large sheathing bracts (spathes): perianth of 6 segments; stamens usually 3 or 6; ovary superior, 1–3-celled; stigmas 3: *fr. a* 1–3-celled *drupe*. 200 genera with 1500 species, mostly tropical; 10 genera and over 20 species in China.

1. **Trachycarpus** Wendl. 棕櫚属 (Tsung Lü Shu)

Monoecious or polygamous trees with spineless trunk and plicate palmate lvs.; the *petioles spinulose or roughened in lower part or near base*: infl. brg. with numerous small yellow 6-merous fls.: stamens 6; ovaries 3, united at the base. 5 species, in eastern Asia and the Himalayas; 2 in China. (From the Greek terms meaning "rough" and "fruit."

1. **Trachycarpus fortunei** (Hook.) Wendl. (*T. excelsus* Wendl.) Windmill Palm 棕櫚 (Tsung Lü; Coir Palm) (B.M. 167). Tree, to 8 m.; fls. yellow, IV–V; fr. dry, VIII–X. China and Japan; locally in An., Che., Ki., Ku. Planted. Fig. 464.

181. ARACEAE Arum Family 天南星科 (T'ien Nan Hsing K'o)

Perennial *herbs* (ours) with acrid or sometimes milky juice and alternate coriaceous lvs., from rhizomes or corms; the tissues bearing abundant slender rhaphides: *infl. a spadix*, usually *enclosed by a spathe*: fls. small, sessile: fr. a 1-many-seeded berry. 105 genera with nearly 1,500 species, mostly tropical, but some widely distributed; 13 genera and 40 species in China.

Key to the Genera

A. Lvs. narrow, sword-like: spadix cylindric, not enclosed in a spathe; fls. bisexual (*Pothoideae*) ..... 1. *Acorus*

AA. Lvs. broad, not sword-like, simple or compound: spadix cylindric, enclosed by a spathe.

B. Flg. peduncle separate, appearing in advance of the lvs.: spathes very large (*Lasioideae*) ..... 2. *Amorphophallus*

BB. Flg. peduncles appearing with or after the lvs.

Lvs. simple, entire, large, ovate-cordate, peltate: blades of the spathes yellow: appendage of the spadix short or none (*Colocasioideae*) ..... 3. *Colocasia*

Lf. blades lobed or divided (except in some *Pinellia*): spathes greenish, brownish or purple: appendages various, usually well-developed (*Aroideae*).

Ovary with several ovules: fr. a few-seeded berry: staminate and pistillate fls. contiguous on the spadix ..... 4. *Arisaema*

Ovary with one ovule: fr. a one-seeded berry: staminate and pistillate fls. separated on the spadix by a naked band and by a septum of the spathe ..... 5. *Pinellia*

1. **Acorus** Linn. Sweet Flag 白菖属 (Pai Ch'ang Shu)

Aromatic *marsh plants* from creeping rhizomes: *lvs. grass-like*: peduncle leaf-like, bearing a single *cylindrical spadix* which is subtended by an herbaceous prolongation of the peduncle, but is not enclosed in a spathe: *fls. perfect*, 6-merous: fr. a few-seeded berry. Two species, in the northern hemisphere. (An old Greek name.)

Key to the Species

Plants 4–12 dm. tall: lvs. with prominent midrib: spathe extending like a well-developed lf..... 1. *A. calamus*
Plants 1–4 dm. tall: lvs. without midrib: spathe weakly developed..... 2. *A. gramineus*

1. **Acorus calamus** Linn. 白菖蒲 (Pai Ch'ang P'u; White Sweet-flag) (B.M.180). Coarse, reed-like, 1–2 m. tall; fls. yellowish, V–VI; lvs. 10–15 mm. wide. Northern hemisphere; locally in Ku. Marshes. Fig. 465.
2. **Acorus gramineus** Ait. 石菖蒲 (Shih Ch'ang P'u; Stone Sweet-flag) (B.M.180). Grass-like, 3–4 dm. tall; fls. yellowish, V–VII; lvs. 3–5 mm. wide. Asia; locally in An., Che., Hun., Hup., Ki., Ku. Marshes.

2. **Amorphophallus** Blume 蒟蒻属 (Kou Yo Shu)

Erect herbs from large fleshy corms: lvs. borne on a long roughened mottled petiole, tripartite; segments irregularly pinnatisect; rachis winged: *flg. scape developing before the lvs.*: *spathe* and spadix various, often *very large*: anthers 2–4; ovaries 1–4-celled: fr. a 1–4-seeded berry. About 90 species, especially in the eastern tropics; 5 in China. (From the Greek terms meaning "deformed phallus".)

1. **Amorphophallus sinensis** Belval 水芋 (Mu Yu; Woody Taro) (BSBF 80:98). Stout, to 1.5 m.; fls. rose to violet, V–VI; spathe mottled; fr. red, becoming blue, VII. China; locally in An., Ku. Moist woods.

3. **Colocasia** Schott 芋属 (Yü Shu)

Coarse stout herbs from fleshy corms; with large *simple entire ovate-cordate peltate lvs.*: *spadix enclosed by the spathe*: *fls. unisexual*; the staminate (above) and the pistillate (below) separated by a zone of neutral ones (staminodes): berries small. 8 species, in Indomalaya; one cultivated in China. (An old Greek name.)

1. **Colocasia esculenta** (L.) Schott Taro 芋 (Yü; Flourishing Root) (B.M. 189). Stout, to 1 m. Tropical countries; locally in An., Che., Ki., Ku. Cultivated, food. Fig. 466.

4. **Arisaema** Mart. Dragon Arum 天南星属 (T'ien Nan Hsing Shu)

Erect cormose herbs: lvs. palmately compound, with membranous lfts.: peduncle solitary: *spadix enclosed by the spathe*; *tube of the spathe unconstricted and open at the top*; spathe margins overlapping but not connate: fls. unisexual; the pistillate below; ovary with two or more ovules: fr. a scarlet berry. Over 100 species, in temperate and tropical Asia, Ethiopia, and North America; 15 in China. (From the Greek terms meaning "a kind of arum" and "blood", referring to the spotted leaves of some species.)

Key to the Species

a. Appendage of the spadix tapering to a slender or filamentous point, somewhat swollen near the base: spathe pale green outside (sect. *Tortuosa*) ..... 1. *A. ambiguum*

aa. Appendage of the spadix cylindric or claviform.

Spathe tapering to a slender filamentous tip, green and glaucescent outside, purple-striped within: appendage claviform, tapering toward the base but not stipitate (Sect. *Clavata*) 2. *A. consanguineum*

Spathe acute or acuminate but not with a filamentous tip: appendage of the spadix stipitate, cylindric, truncate at base.

Blade of the spathe with margins scarcely if at all reflexed, not much auriculate and not helmet-shaped (Sect. *Pistillata*).. 3. *A. sazensoo*

Blade of the spathe conspicuously auriculate and helmet-shaped (Sect. *Ringentia*) ..... 4. *A. ringens*

1. **Arisaema ambiguum** Engl. (E.P.IV.23 F.:187). Stout, 4–10 dm. high; fls. V; spathe pale green; fr. red, IX; appendage of spadix not stipitate. Central China; locally in Hun., Ku. Moist woods.
2. **Arisaema consanguineum** Schott (E.P.IV. 23 F.:175). Stout, 7–10 dm. high; fls. IV–VI. Temperate and subtropical eastern Asia; locally in Hun., Hup., Ki. Moist woodland.
3. **Arisaema sazensoo** (Burger) Mak. (E.P.IV. 23 F:209). Stout, 6–8 dm. high; fls. V; spathe dark purple. Subtropical eastern Asia; locally in Che., Ku. Moist woods.
4. **Arisaema ringens** (Thunb.) Schott (Mak.F.776). Stout, 6–8dm. high; fls. V–VIII; spathe pale green and dark purple, helmet-shaped. Subtropical eastern Asia; locally in Che., Ku. Moist woods.

5. **Pinellia** Tenore 半夏属 (Pan Hsia Shu)

Erect cormose herbs with simple, ternate or pedately cleft membranous lvs. in juvenile forms simple, ovate-cordate, sometimes sagittate: peduncle solitary: *spadix* with a slender coiled exserted tip; the flg. portion *enclosed by the spathe*: *tube of the spathe constricted and more or less closed at the top*: fls. unisexual; the pistillate below: ovary with one ovule. 6 species, in China and Japan; 5 in China. (Named for G. V. Pinelli, 1535–1601, Italian patron of learning.)

Key to the Species

Lf. blades simple, entire, cordate..... 1. *P. cordata*

Lf. blades trisect, ternate or pedatisect.

Lf. blades trisect or ternate ..... 2. *P. ternata*

Lf. blades pedatisect ..... 3. *P. pedatisecta*

1. **Pinellia cordata** N.E.Brown (F.H.E.3:173). Slender, 10–15 cm. high. Central China; locally in Che., Ki. Moist woods.
2. **Pinellia ternata** (Thunb.) Tenore ex Breitenb. acc. to Mak. (*P. tuberifera Tenore* 半夏 (Pan Hsia; Mid-summer) (Mak.F. 776). Slender, 1–2 dm. high; fls. V–VII. Eastern Asia; locally in Che., Hun., Hup., Ku. Moist woods. Fig. 467

The authority for the name *Pinellia ternata* has been variously interpreted. Breitenbach (Bot. Zeit. 37: 687. 1879) gave *Pinellia ternata* Ten. as a synonym in his carefully illustrated article entitled "Die Blütheneinrichtung von Arum ternatum Thnbg." Makino (Bot. Mag. Tokyo 15: 135–136. 1901) used *Pinellia ternata* (Thunb.) Breitenb., based on the first reference cited

above, with *Arum ternatum* Thunb. (1784) as the name-bringing synonym. Since citation as a synonym is not valid publication (Int. Code of Bot. Nomen. 1952. Art. 46), it appears that Makino, in the reference mentioned above is the first authority to validly publish the name *Pinellia ternata*, even though he omitted mention of Tenore to whom Breitenbach credited the name. Engler (Das Pflanzeur. IV. F. 222–224. 1920) also credits the combination to Breitenbach without mentioning Tenore. Index Kewensis, Suppl. VI. 155 (1926) gives *Pinellia ternata* (Thunb.) Druce in Rep. Bot. Exch. Cl. Brit. Isles, 1916: 640 (1917). This reference was not seen, but the combination is clearly of later date than Makino's cited above. Finally, Index Kewensis, Suppl. VIII. 184 (1933) gives *Pinellia ternata* (Thunb.) Ten. ex Breitenb., using the reference first mentioned above. The present writer accepts Makino as the earliest known valid authority for the combination.

3. **Pinellia pedatisecta** Schott (E.P.IV.23F.224) Scapose fleshy herb, to 7dm.; fls. V–VI. China; locally in Ku. Moist woods.

182. **LEMNACEAE** Duckweed Family 浮萍科 (Fu P'ing K'o)

Monoecious *scale-like floating plants lacking normal stems and lvs.*, mostly propagating by budding of the thallus: fls. 1–3 to a thallus, without perianth; stamens 1 or 2; ovary 1-celled: fr. a 1–7-seeded utricle. 4 genera with about 30 species, cosmopolitan; 3 genera and 4 species in China. The simplest and some of the smallest flowering plants known.

Key to the Genera

Plant with rootlets.
- Plant with several rootlets; thallus 5–15-nerved, and red beneath..... 1. *Spirodela*
- Plant with a single rootlet; thallus 1–5-nerved, and green beneath ..... 2. *Lemna*

Plant without rootlets; thallus ovoid, very small ..... 3. *Wolffia*

1. **Spirodela** Schleid. 浮萍屬 (Fu P'ing Shu)

Thallus 5–15-nerved, with *several* vascular *rootlets* beneath: fls. as in *Lemna*. Two species, cosmopolitan, except Africa; one in China. (Greek: *speira*, a cord and *delos* evident.)

1. **Spirodela polyrhiza** (L.) Schleid. 浮萍 (Fu P'ing; Floating Duckweed) (G.M.385). Floating; thallus with several roots. Tropical and north temperate regions; locally in Che., Hup., Ku. On ponds and lakes.

2. **Lemna** Linn. Duckweed 品藻屬 (P'in Tsao Shu)

Thallus 1–5-nerved, with *a single* non-vascular rootlet beneath: *fls.* borne in clefts on the margin of the thallus, usually *3 in one place*; two staminate, each consisting of a single stamen; and one pistillate, a simple pistil. 6 species, cosmopolitan; 2 in China. (The Greek name of a water plant.)

Key to the Species

Fronds elliptic or almost circular, 2–5 mm. across.
- Fronds symmetrical; root-sheath not appendaged; root-cap obtuse: seed horizontal..... 1. *L. minor*
- Fronds asymmetrical: root-sheath appendaged; root-cap acute: seed erect..... 2. *L. paucicostata*

Fronds oblong-lanceolate, 5–10 mm. long ..... 3. *L. trisulca*

1. **Lemna minor** Linn. 浮萍 (Fu P'iao; Floating-drifting duckweed) (G.M.386). Folating; fr. VI–IX. Temperate and tropical regions; locally in Che., Ki., Ku. On ponds and lakes. Fig. 468.
2. **Lemna paucicostata** Hegelm. (M.F.134). Floating; fr. VI–IX. Tropical regions; locally in Hon., Ku. On ponds and lakes.
3. **Lemna trisulca** Linn. 品藻 (P'in Tsao) (G.M.386). Floating. Temperate and tropical regions; locally in Ku. On ponds and lakes.

3. **Wolffia** Horkel ex Schleid. 無萍屬 (Wu P'ing Shu)

Thallus minute, nerveless, *rootless*: *fls.* bursting through the upper surface, *two in one place*; one staminate and one pistillate. 12 species, in tropical and temperate regions; one in China. The simplest and smallest of flg. plants. (Named for Johann Friedrich Wolff, who wrote on Lemna in 1801.)

1. **Wolffia arrhiza** (L.) Wimm. (Hegi 2:142). Floating; thallus minute, rootless. World wide; locally in Ku. On ponds and lakes.

183. **ERIOCAULACEAE** Pipewort Family 穀精草科 (Ku Ching Ts'ao K'o)

Aquatic or marsh herbs, usually stemless, and with lvs. crowded in a rosette: *infl. in pedunculate globular or hemispherical androgynous pubescent involucrate heads*: perianth of scales, often of two whorls: fr. a 3-lobed membranous capsule with small seeds. 12 genera with 1,100 species, in warm countries; one genus and 20 species in China.

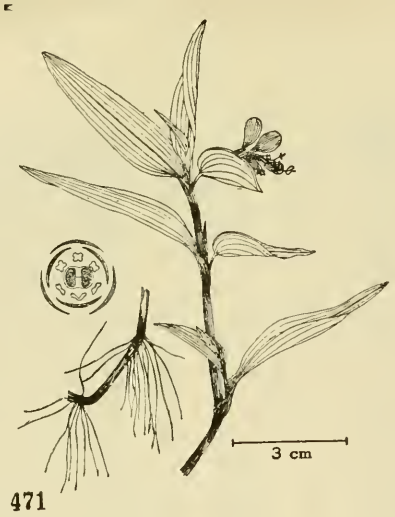
1. **Eriocaulon** Linn. Pipewort 穀精草屬 (Ku Ching Ts'ao Shu)

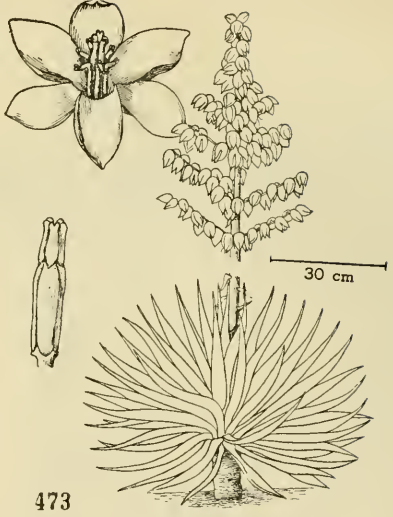
Fls. androgynous and monoecious, both kinds in one head: *perianth double*, of two whorls; stamens 2× the lobes of the inner perianth whorl; *anthers 2-celled*. Over 250 species, in warm countries; 20 in China. (Greek: *erion*, wool, and *caulos*, a stalk, from the wool at the base of the scape in the original species.)

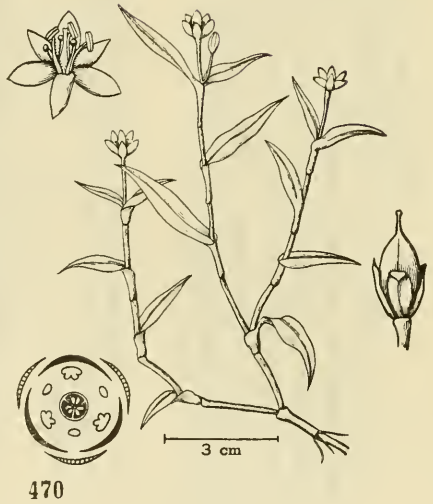
Key to the Species

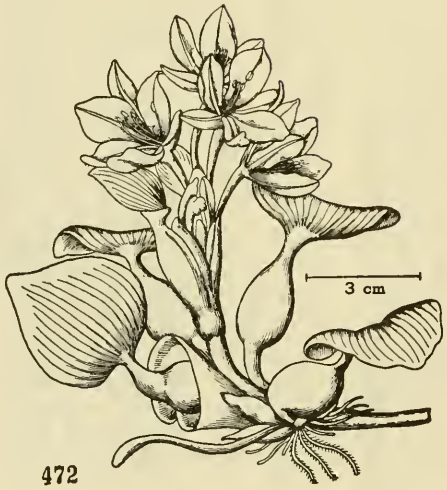
Lvs. lanceolate, broad at the base, tapering to a fine point, 3–5 mm. broad at middle: anthers black.	
Floral bracts glabrous	1. *E. alpestre* var. *robustius*
Floral bracts with white opaque (when dry) hairs at tip on back	2. *E. buergerianum*
Lvs. linear, narrow at base, about 1 mm. broad at middle: anthers white	3. *E. sieboldianum*

1. **Eriocaulon alpestre** Hk.f. & Thoms. var. **robustius** Maxim. (*E. robustius* (Maxim.) Mak.) (Mak.F.772). Tufted herb, 10–25 cm. high; fls. straw-colored, IX. Eastern Asia; locally in Che., Ku. Stream banks.
2. **Eriocaulon buergerianum** Koern. (E.P.IV.30:94). Erect, 15–25 cm. high; fls. white, VIII. Eastern Asia; locally in An., Ki., Ku. Swamps and slow streams. Fig. 469.
3. **Eriocaulon sieboldianum** Sieb. & Zucc. 穀精草 (Ku Ching Ts'ao; Essence-of-cereal Herb) (Mak.F.771). Erect, 5–15 cm. high; fls. straw-colored, IX–X; anthers white. Eastern Asia; locally in An., Che., Ki. In shallow water.









469. Eriocaulon buergerianum
470. Aneilema keisak
471. Commelina communis
472. Eichornia crassipes
473. Yucca filamentosa
474. Tricyrtis sp.

184. **COMMELINACEAE** Spiderwort Family 鴨跖草科 (Ya Chih Ts'ao K'o)

Herbs with nodose stems bearing *alternate* entire often succulent parallel-nerved *lvs.* which sheath at the base: fls. perfect, more or less irregular: sepals 3, herbaceous; petals 3, white, purple or yellow; stamens 6, some of them often sterile; anther cells separate; filaments often hairy; *ovary superior*: *fr. a* 2–3-celled *few-seeded capsule.* 37 genera with 600 species, tropical and subtropical; 9 genera and over 30 species in China.

Key to the Genera

A. Fls. many, in open panicles, not enclosed in a spathe.
  Fr. a loculicidal capsule: stamens 3 or 2 ..... 1. *Aneilema*
  Fr. indehiscent: stamens 6 ..... 2. *Pollia*
AA. Fls. few, more or less enclosed in folded spathe-like bracts.
  Fertile stamens 2 or 3: fls. blue: petals free ..... 3. *Commelina*
  Fertile stamens 5 or 6: fls. reddish purple: petals united into a slender tube ..... 4. *Zebrina*

1. **Aneilema** R. Br. 水竹葉属 (Shui Chu Yeh Shu)

Infl. in open panicles, not enclosed in spathe-like bracts: fertile stamens usually 3: ovary sessile: capsule loculicidal. 100 species, in tropical Asia; 15 in China. (Greek: *aneu*, without, and *eilema*, spathe.)

Key to the Species

Fls. 1 or 2 in the axils of the upper lvs.: seeds 3 or more in each cell of the capsule ..... 1. *A. keisak*
Fls. several in a terminal raceme: seeds 2 in each cell of the capsule.. 2. *A. nudiflorum*

1. **Aneilema keisak** Hassk. 水竹葉 (Shui Chu Yeh; Water Bamboo Leaf) (Mak.F.768). Decumbent, 20–40 cm. high; fls. VIII–IX, blue or pink; Eastern Asia; locally in Che., Ku. Moist ground. Fig. 470.
2. **Aneilema nudiflorum** (L.) Wall. (*A. malabaricum* (L.) Merr.) (M.F.138; AA.J.18:65). Weak herb, 10–30 cm. high; fls. VIII–IX, pink-purple. Eastern Asia and Malaya; locally in An., Che., Hup. Moist ground.

2. **Pollia** Thunb. 杜若属 (Tu Jo Shu)

Perennial herbs with erect or ascending stems, rooting at the base, with large ovate-lanceolate or elliptic-lanceolate lvs. which taper into the sheaths: *infl. in* stiff umbellate often condensed *panicles*; fls. nearly regular: perianth segments free; sepals somewhat petaloid; petals white or rose colored, one narrower than the others; *stamens 6*, 3 of them sterile; ovary 3-celled: *fr.* globular or ovoid, somewhat fleshy, *indehiscent*, with many angular seeds. 16 species, in the Old World tropics; 2 in China. (Named after Jan van der Poll.)

1. **Pollia japonica** Thunb. 杜若 (Tu Jo) (Mak.F.770). Stout, erect, 4–6 dm. high; fls. white, VII–VIII; fr. IX–X. Eastern Asia; locally in An., Che., Hun., Ki. Moist woodland.

3. **Commelina** Linn. Day-flower 鴨跖草属 (Ya Chih Ts'ao Shu)

Fls. emerging one at a time *from a* terminal *folded spathe-like bract* and withering

after a single day: *petals* blue, white or yellow, *free*; *fertile stamens 3*; the sterile ones with cross-shaped anthers; filaments glabrous; ovary sessile: fr. 2- or 3-celled. 115 species, tropical and subtropical; 7 in China. (After Kaspar, 1667–1731, and Johann, 1629–1698, Commelin, Dutch botanists.)

Key to the Species

Spathe turbinate (open only at the top), pubescent: capsule 3-celled.. 1. *C. benghalensis*
Spathe cordate, folded, glabrous: capsule 2-celled ..... 2. *C. communis*

1. **Commelina benghalensis** Linn. 竹葉菜 (Chu Yeh Ts'ai; Bamboo-leaf Plant) (M.F. 138). Decumbent, 2–4 dm. high; fls. blue, VII–IX; fr. IX–X. Old World tropics; locally in Hup., Ku. Moist ground.
2. **Commelina communis** Linn. Asiatic Day-flower 鴨跖草 (Ya Chih Ts'ao; Duck-foot Herb) (G.M.392). Creeping herb, 2–4 dm. high; fls. blue, V–IX. Tropical regions, especially eastern Asia; locally in An., Che., Hup., Ki., Ku. Moist ground. Fig. 471.

Pennell (Phil. Ac. Pr. 90: 36) has keyed and described a number of varieties and forms within the broad concept of *C. communis*. The two following occur in the Lower Yangtze Valley:

2a. **Commelina communis exserta** Pennell (Phil.Ac.Pr.90:36). Northeastern Asia; Che. Fls. long-exserted.
2b. **Commelina communis ludens** (Miq.) Clarke (Phil.Ac.Pr.90:37). Japan, China; An., Ku. Fls. included or shortly-exserted.

4. **Zebrina** Schnizl. 斑馬草属 (Pan Ma Ts'ao Shu)

Fls. clustered between two folded bracts: *petals united into a tube* longer than the calyx, reddish purple; *stamens 6*, *equal*; ovary 3-celled: fr. 6-seeded. Two species, Mexico, New Mexico and Texas; one cultivated in China. (Latin: *zebra*, referring to the striped leaves.)

1. **Zebrina pendula** Schnizl. Wandering Jew (B.M.198). Decumbent herb; fls. white and purple, IX. Mexico; locally in Ku. Planted, ornamental.

185. PONTEDERIACEAE Pickerel Weed Family 雨久花科 (Yü Chiu Hua K'o)

Aquatic or marsh herbs, glabrous, erect or floating: lvs. petioled and with thick blades or long and grass-like: fls. perfect, in spikes or racemes from the sheath of the upper lf., more or less irregular: *perianth* 6-parted, *corolloid*, blue, marcescent; stamens 1–6, often unequal, on the base of the perianth; *ovary superior*: fr., a *3-celled* capsule or a utricle. 6 genera with 28 species, in warm countries; 2 genera and 5 species in China.

Key to the Genera

Perianth funnel-shaped: floating plants ..... 1. *Eichornia*
Perianth of nearly separate segments: marsh plants ..... 2. *Monochoria*

1. **Eichornia** Kunth 鳳眼蓮属 (Fêng Yien Lien Shu)

Floating, rooting at the nodes: lvs. usually obovate or cordate: *perianth funnel-*

shaped: stamens 6, some of them exserted: fr. 3-celled. 5 species, in South America and tropical Africa; one introduced in China. (After J. A. F. Eichhorn, 1779–1856, Prussian Minister of public instruction.)

1. **Eichornia crassipes** (Mart.) Solms Water Hyacinth (B.M.199). Floating or rooting in mud; fls. violet purple, spotted blue and yellow, VI–IX. Tropical and subtropical America; locally in Che., Ku. Ponds and lakes. Fig. 472.

2. **Monochoria** Presl 雨久花属 (Yü Chiu Hua Shu)

Marsh plants with *erect lvs.*: *perianth of nearly separate segments*: stamens 6, one of them larger than the others: fr. a 3-valved capsule. 6 species, in eastern tropics; 4 in China. (Greek: *mono*, one, and *chore*, to separate, referring to one stamen being longer than the others.)

Key to the Species

Plant conspicuous, 30–50 cm. high: lvs. large, 5–12 cm. across: infl. several-fld., developing upward at the top of an erect shoot..... 1. *M. korsakowii*

Plant small, 12–18 cm. high: lvs. small, 0.5–2.5 cm. across: infl. few-fld. (usually 2–3-fld.), on a short axillary shoot ..... 2. *M. vaginalis* var. *plantaginea*

1. **Monochoria korsakowii** Regel & Maack 雨久花 (Yü Chiu Hua; Continuous-rain Flower) (Mak.F.768). Stout herb, 3–5 dm. high; fls. bluish purple, VIII–X; fr. X–XI. Eastern Asia; locally in An., Ku. Lakes and streams.
2. **Monochoria vaginalis** (Burm.f.) Presl var. **plantaginea** (Roxb.) Solms (*M. v.* var. *pauciflora* (Bl.) Merr.) (M.F.141; M.E.1:201). Spreading, 12–18 cm. high; fls. bluish purple, VII–IX. Tropical and subtropical Malaysia; locally in An., Che., Hun., Ki. Lakes and streams.

186. **JUNCACEAE** Rush Family 燈心草科 (Têng Hsin Ts'ao K'o)

Grass-like or rush-like herbs, mostly of wet or boggy places: fls. bisexual; *perianth chaff-like*, of 6 greenish or brownish segments; stamens usually 6, stigmas 3: fr. a 3-valved several-many-seeded capsule. 8 genera with 315 species, widely distributed; 2 genera and 25 species in China.

Key to the Genera

Capsule 3-celled, many-seeded: plants always glabrous ..... 1. *Juncus*

Capsule 1-celled, 3-seeded: plants often hairy ..... 2. *Luzula*

1. **Juncus** Linn. Rush 燈心草属 (Têng Hsin Ts'ao Shu)

Rush-like perennial herbs with *smooth* stems, growing in wet soil or in water: infl. of clusters of small greenish or brownish fls.: *capsule 3-celled, many-seeded.* 225 species, cosmopolitan; 20 in China. (Latin: *jungere*, to join, referring to the use of the stems for bands.)

Key to the Species

a. Stems leafless: infl. a lateral cyme ..... 1. *J. effusus*

aa. Stems leaf-bearing: infl. a terminal cyme.

Stems flat and winged: lvs. flat, not septate ..... 2. *J. alatus*

Stems cylindric or compressed, not winged.

Lvs. stiff and tubular, regularly septate: seeds fusiform, coarsely and finely reticulate ..... 3. *J. leptospermus*
Lvs. soft, usually compressed, more or less septate: seeds obovoid or ellipsoid, finely reticulate ..... 4. *J. prismatocarpus* var. *leschenaultii*

1. **Juncus effusus** Linn. Common Rush 燈心草 (Têng Hsin Ts'ao; Lamp-wick Grass) (G.M.406). Slender, tufted, 3–9 dm. high; fr. brown, VII–IX. Worldwide; locally in An., Che., Hun., Hup., Ku. Swampy ground.
2. **Juncus alatus** Franch. & Sav. (Mak.F.766). Grass-like, to 5 dm.; fr. brown, VII. Japan and China; locally in Che., Hun., Hup., Ki., Ku. Moist meadows.
3. **Juncus leptospermus** Buchenau (H.F.6:396). Stiff, erect, 4–7 dm. high; fr. brown, VI–VII. Eastern Asia; locally in An., Che. Grassland.
4. **Juncus prismatocarpus** R. Br. var. **leschenaultii** Buchenau 三稜草 (San Lêng Ts'ao; Three-cornered Grass) (Mak.F.766). Grass-like, 1–4 dm. high; fr. brown, VII–IX. Eastern Asia to Australia; locally in An., Che., Hun., Hup., Ki., Ku. Moist grassland.

2. **Luzula** DC. Wood Rush 地楊梅屬 (Ti Yang Mei Shu)

Grass-like leafy perennial herbs with soft usually *hairy* lvs.: infl. of crowded clusters of small greenish fls.: *capsule 1-celled* 3-seeded. 65 species, in temperate regions; 5 in China. (From "Gramen Luzulae", or "Luxulae", diminutive of *lux*, light, a name for one of the species from its shining with dew.)

1. **Luzula campestris** (L.) DC. 地楊梅 (Ti Yang Mei) (G.M.418). Grasslike, 15–30 cm. high; fls. brown, III–V; fr. brown, VI–VII. Temperate regions; locally in Ku. Moist grassland.

187. **STEMONACEAE** Stemona Family 百部科 (Pai Pu K'o)

Erect or climbing *herbs* with tuberous or creeping rootstocks: lvs. 3–several-nerved: flg. peduncles axillary; *fls.* regular, bisexual, *4-merous*: *perianth segments all alike*; *ovary superior, 1-celled*; stigmas 1 or 3; *fr.* a 2-valved *many-seeded* capsule. 3 genera with about 25 species, in tropical and subtropical Asia, Australia and North America; one genus and 5–8 species in China.

1. **Stemona** Lour. 百部屬 (Pai Pu Shu; One-hundred-roots Genus)

Glabrous herbs with tuberous fusiform roots and alternate or whorled 3–9-nerved lvs.: *fls. large* (1–2 cm. long in ours), solitary or few: perianth segments 4, many-nerved; stamens 4; filaments very short, more or less united; *anthers bearing a* long erect *linear appendage*; capsule ovoid or oblong, compressed: seeds erect, grooved and beaked. 8 species, Asia to Australia; 5 in China. (Greek: *stemon*, stamen, referring to the striking form of the stamens.)

Key to the Species

a. Climbing vines, herbaceous or suffruticose: lvs. with slender rather long petioles, 7–9-nerved.
Flg. peduncles free, not joined to the leaf-blades: lvs. very acute, tapering from a cordate base ..... 1. *S. acuta*
Flg. peduncles joined to the basal portion of the subtending leaf-blades:

lvs. acute; base rotund but not cordate ..... 2. *S. japonica*

aa. Erect herbs: lvs. sessile or with short stout petioles, 3-5-nerved.

Lvs. short-petiolate; blades elliptic-cuspidate: fls. from the base of the stem, appearing with the lfy. shoot ..... 3. *S. erecta*

Lvs. sessile, obovate or broadly ovate, apiculate: fls. from middle and upper lf. axils as well as from the basal ones, appearing after the lvs ..... 4. *S. sessilifolia*

1. **Stemona acuta** C. H. Wright (F.H.E.3:94). Vine with tuberous roots; fls. purple, VII–IX. Eastern China; locally in An., Che. Moist woods.
2. **Stemona japonica** (Bl.) Miq. (Mak.F.761). Climbing suffruticose vine. Japan and China; locally in Ku. Woodland.
3. **Stemona erecta** C. H. Wright (K.B.1895:117). Erect herb, 3–5 dm. high; fls. greenish purple, V. Eastern China; locally in An., Ku. Grassland.
4. **Stemona sessilifolia** Miq. (Mak.F.761). Erect herb. Japan, China; locally in An., Ku. Woodland.

188. LILIACEAE Lily Family 百合科 (Pai Ho K'o)

Herbs with fibrous roots or from rhizomes, bulbs or corms, sometimes woody vines, shrubs or trees: *lvs. alternate* (whorled in *Paris*), parallel-veined (net-veined in *Paris*): *fls. regular*, usually showy: perianth segments of 2 whorls of 3's, the inner and outer colored alike: stamens 6: *ovary superior*, 3-celled, becoming a many-seeded dehiscent capsule or berry. 240 genera with 4,000 species, widely distributed; 50 genera and 250 species in China. Many in cultivation.

Key to the Genera

A. Fls. perfect or monoecious.
B. Perianth cleft or divided.
C. Fr. a capsule.
D. Stems without bulbs at the base.
E. Lvs. stiff and sword-like, spine-tipped ..... 1. *Yucca*
EE. Lvs. not stiff and spine-tipped.
F. Anthers extrorse ..... 2. *Tricyrtis*
FF. Anthers introrse.
G. Lf. blades broad and lanceolate.
Fls. large (4–12 cm. long), blue, lilac or white, in terminal racemes ..... 3. *Hosta*
Fls. small (not over 2 cm. long), in panicles or racemes.
Plants with erect lfy. stems: fls. in terminal panicles ..... 4. *Veratrum*
Plants with horizontal stems and clusters of basal lvs.: fls. in racemes on slender nearly leafless scapes which may also bear offsets ..... 5. *Chlorophytum*
GG. Lf. blades linear: fls. large (4–12 cm. long), orange or yellow ..... 6. *Hemerocallis*
DD. Stems with bulbs at the base.
H. Fls. in umbels: plants garlic-scented ..... 7. *Allium*
HH. Fls. not in umbels: plants not garlic-scented
I. Plants with lfy. stems.
Anthers versatile ..... 8. *Lilium*

Anthers basifixed.
Perianth segments with a nectar-bearing pit or spot ..... 9. *Fritillaria*
Perianth segments without nectar-bearing pit 10. *Tulipa*
II. Lvs. basal: fls. borne on a leafless scape.
Perianth segments distinct to the base ..... 11. *Scilla*
Perianth segments united at the base ..... 12. *Hyacinthus*
CC. Fr. a berry.
J. Lvs., at least some of them, broad.
K. Plants with lfy. stems.
Stem lvs. whorled..... 13. *Paris*
Stem lvs. alternate ..... 14. *Disporum*
KK. Plants acaulescent.
Lvs. broader and coarse (4–7 cm. broad)..... 15. *Rohdea*
Lvs. narrower (1–2 cm. broad), soft ..... 16. *Reineckia*
JJ. Lvs. linear, grass-like or rush-like.
Infl. a spreading panicle..... 17. *Dianella*
Infl. a spike-like raceme.
Ovary superior: stamens with blunt anthers.... 18. *Liriope*
Ovary partly or wholly inferior: anthers pointed. 19. *Ophiopogon*
BB. Perianth lobed or shortly cleft.
Stem not leafy, except at the base ..... 20. *Aletris*
Stem leafy, except at the base ..... 21. *Polygonatum*
AA. Fls. dioecious.
Lvs. flat: fls. in umbels: mostly woody plants..... 22. *Smilax*
Lvs. scale-like: foliage represented by flattened needle-like brs. borne in the axils of small scales ..... 23. *Asparagus*

1. **Yucca** Linn. Spanish Bayonet 絲蘭屬 (Ssŭ Lan Shu)

Nearly stemless perennials, shrubs or small trees with long *stiff sword-shaped sharply pointed lvs.*: infl. a large terminal panicle of showy usually white perfect fls.; perianth cup- or saucer-shaped, usually pendulous; segments distinct or nearly so; stamens shorter than the perianth: *fr. an* ovoid to oblong *capsule*. 30 species, in North and Central America; one cultivated in China. (The Carib name for the Cassava (*Manihot*), erroneously applied by Gerarde to this plant.)

1. **Yucca filamentosa** Linn. Adam's Needle 絲蘭 (Ssŭ Lan; Silk Orchid) (B.M.240). Shrub, 1–2 m. high; fls. white, VI. Eastern North America, widely planted; locally in An., Ku. Planted, ornamental. Fig. 473.

2. **Tricyrtis** Wall. Toad-lily 油点草屬 (Yu Tien Ts'ao Shu)

Perennial herbs from short rhizomes or from fibrous roots: stems simple, with *broad* nearly sessile or clasping *lvs.*: fls. terminal or axillary, not lily-like: perianth brown-spotted inside; the three outer segments saccate at the base; *anthers extrorse*; style 2-parted: capsule septicidal. 8 species, in eastern Asia; 4 in China. (Greek *tri*, three, and *cyrto*, curved, referring to the nectar sacs on the outer perianth segments. Fig. 474.

1. **Tricyrtis macropoda** Miq. 油点草 (Yu Tien Ts'ao; Oil-spot Herb) (Mak.F.754). Erect, 8–10 dm. high; fls. purple-mottled, VI–VIII; fr. IX–X. Eastern Asia; locally in An., Che., Ki., Ku. Woodland.

3. **Hosta** Tratt. Plantain-lily 紫萼属 (Tzŭ O Shu)

Perennial herbs from cord-like fascicled roots: lvs. broad, several-ribbed, basal: *fls. large, in terminal racemes* on several scapes, *blue, lilac* or *white*: stamens equal to or exceeding the perianth; *anthers introrse*: fr. an elongated loculicidal capsule. 10 species, in eastern Asia; 4 in China. (For N. T. Host, Austrian botanist and physician, died 1834.)

Key to the Species

Fls. white, 8–12 cm. long: capsule 5–6 cm. long..... 1. *H. plantaginea*
Fls. blue, purple or lilac, 4–5 cm. long: capsule about 3 cm. long.
  Lvs. lanceolate, tapering at both ends: perianth expanding gradually from the tube ..... 2. *H. lancifolia*
  Lvs. broadly ovate, sometimes subcordate at base: perianth expanding abruptly into the bell-shaped part of the fl..... 3. *H. ventricosa*

1. **Hosta plantaginea** (Lam.) Aschers. Fragrant Plantain-Lily 玉簪花 (Yü Tsan Hua; Jade-hairpin Flower) (B.M.206). Tufted, to 1 m.; fls. white, 8–12 cm. long, IX; fr. X. Eastern Asia; locally in Hup., Ku. Moist shade. Fig. 475.
2. **Hosta lancifolia** (Thunb.) Engl. Narrow-leaved Plantain Lily (B.M.207). Tufted, 5–8 dm. high; fls. lilac, VII. Japan, China; locally in An., Ki. Woodland shade.
3. **Hosta ventricosa** (Salisb.) Stearn (*H. caerulea* (Andr.) Tratt.) Blue Plantain-Lily 紫萼 (Tzŭ O; Purple Calyx) (B.M.206). Tufted, to 1 m. high; fls. blue, 4–5 cm. long, VII; fr. VIII. Eastern Asia; locally in An., Che., Ki., Ku. Moist shade.

4. **Veratrum** Linn. False Hellebore 藜蘆属 (Li Lu Shu)

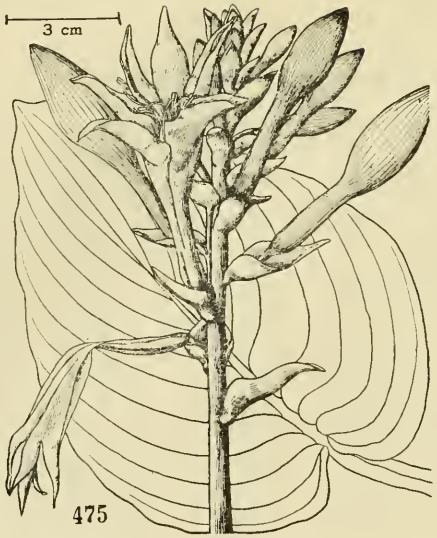
Pubescent, perennial herbs from a thickened base (very poisonous) producing fibrous roots and simple *erect* lfy. *stems*: *lvs. broad*, 3-ranked, plaited and strongly nerved: *fls. small*, numerous, in terminal panicles: perianth greenish or brownish; *anthers extrorse*: fr. a 3-lobed capsule with flat winged seeds. 50 species, in north temperate regions; 5 in China. (Latin: *vere*, very and *ater*, black.)

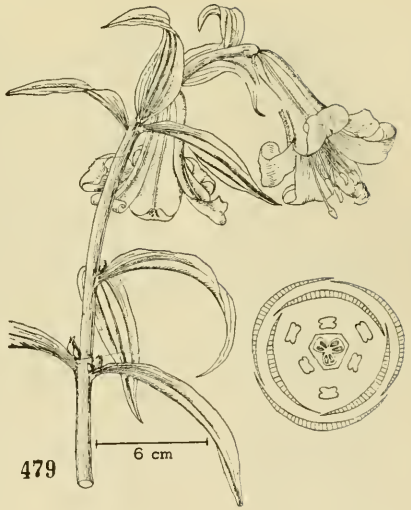
Key to the Species

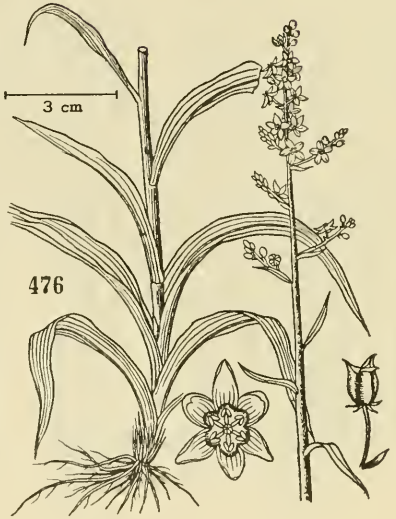
Fls. large, 15–20 mm. in diam., greenish white: all stem lvs. sessile..... 1. *V. album*
Fls. smaller, 6–12 mm. in diam., brownish or purplish: lower stem lvs. petiolate.
  Lateral flg. racemes 8–15 cm. long; pedicels of the fls. 8–18 mm. long.. 2. *V. oblongum*
  Lateral flg. racemes 3–8 cm. long: pedicels of the fls. 3–7 mm. long.... 3. *V. schindleri*

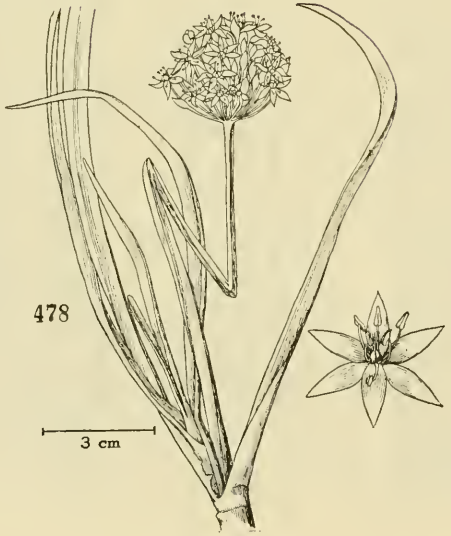
1. **Veratrum album** Linn. 藜蘆 (Li Lu) (B.C.3440). Stout perennial, 1 m. high; fls. greenish white, VI–VII; fr. VII–VIII. Eurasia; locally in Ki. Moist meadows.
2. **Veratrum oblongum** Loes.f. (Fe.R.24:68). Erect herb, 7–9 dm. high; fls. brown or purplish, VII–VIII; fr. IX. Eastern and central China; locally in Hu., Ki. Moist meadows.
3. **Veratrum schindleri** Loes.f. (Fe.R.24:67). Erect herb, about 1 m. high; fls. greenish or brownish, VII–VIII; fr. IX. East-central China; locally in An., Ki. Moist woods. Fig. 476.

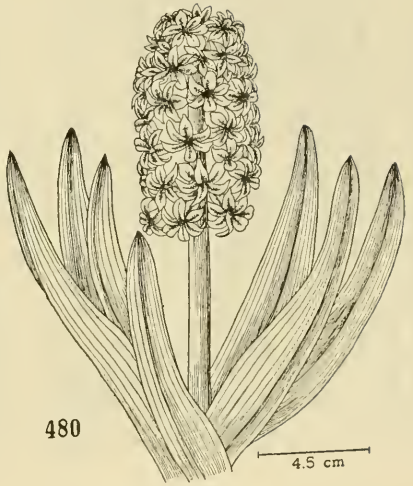
Loesener (Verh. Bot. Ver. Brandenburg 68 (1926) 105–166) has described several new species of *Veratrum* from central China. These differ from species recognized by Baker (Journ. Linn. Soc. Bot. 17 (1879) 469–474) largely in size of leaves and perianth segments, and in length of











475. Hosta plantaginea
476. Veratrum schindleri

477. Hemerocallis falva
478. Allium tuberosum

479. Lilium brownii
480. Hyacinthus orientalis

pedicels. It seems probable that when more abundant material is available for study it will appear that there is such great variation in size of these structures that the validity of some of these species will be open to question.

5. **Chlorophytum** Ker. 掛蘭屬 (Kua Lan Shu)

Plans with horizontal stems and clusters of broad basal lvs. from thickened roots: *fls. small*, white, with delicate peduncles, on *slender nearly leafless scapes*: perianth rotate; anthers dorsifixed: capsule acutely 3-angled, loculicidal, with flattened seeds. 100 species, in tropical regions; 2 in China. (Greek: *chloro*, light green, and *phyte*, plant.)

1. **Chlorophytum elatum** R. Br. 掛蘭 (Kua Lan; Hanging Orchid) (B.M.204). Tufted scapes nearly leafless; fls. whitish, VII–VIII; fr. X. Introduced from South Africa; locally in Ku. Planted, ornamental.

6. **Hemerocallis** Linn. Day-lily 萱草屬 (Hsüan Ts'ao Shu)

Perennial from fascicled tuberous roots: *lvs.* basal, *linear*: *fls. large*, on tall scapes, *orange or yellow*: perianth funnel-form to bell-shaped; anthers more or less versatile: capsule loculicidal, with few seeds. 13 species, in Eurasia; 6 in China. (Greek: *hemero*, but one day, and *callis*, beautiful, referring to the short-lived flowers.)

Key to the Species

Flg. scapes to about 5 dm. high, slender: fls. yellow, fragrant; outer perianth segments about 1 cm. wide ..... 1. *H. minor*

Flg. scapes 8–14 dm. high: outer perianth segments 1.5–2 cm. wide.

Fls. lemon-yellow, fragrant: scapes 10–14 dm. high, slender ..... 2. *H. flava*

Fls. orange-yellow or reddish-yellow, not fragrant: scapes stout, 8–10 dm. high ..... 3. *H. fulva*

1. **Hemerocallis minor** Mill. Dwarf Yellow Day-lily (B.M.208). Slender, to 5 dm. high; fls. yellow. Northeastern Asia; locally in Ku. Grassland.
2. **Hemerocallis flava** Linn. Tall Yellow Day-lily 鹿葱 (Lu Ts'ung; Stag-onion) (B.M.208). Slender, 10–14 dm. high; fls. yellow, VII–VIII; fr. IX–X; lvs. 0.5–1.0 cm. wide. Northeastern Asia; locally in Ku. Grassland.
3. **Hemerocallis fulva** Linn. Orange Day-lily 金針 (Chin Chên; Golden Needle) (B.M.208). Stout, 8–12 dm. high; fls. orange, VI–VII; fr. VIII–IX; lvs. 1–2 cm. wide. Eurasia; locally in An., Che., Hun., Hup., Ki., Ku. Woodland, and cultivated. Fig. 477.

7. **Allium** Linn. Onion 青葱屬 (Ch'ing Ts'ung Shu; Green onion Genus)

Strong-scented perennial scapose herbs from scaly *bulbs*: lvs. narrow, flat or cylindric, often hollow: *fls.* small, *in* terminal *umbels*, sometimes replaced by bulblets, in the bud enclosed by a spathe of one to three thin sheaths: perianth segments distinct or united at the base, corolline, becoming scarious and persistent; ovary 3-celled: capsule loculicidal, 3-valved: seeds 1–3 in each cell, black. About 325 species, in the northern hemisphere; 40 in China. (The ancient Latin name for garlic.)

Key to the Species

a. Lvs. quill-shaped, tubular and hollow.

b. Plants with evident bulbs, annual or biennial.

Lvs. large, few.
Bulbs large, much thicker than the stem..... 1. *A. cepa*
Bulbs small, only a little thicker than the stem ..... 2. *A. fistulosum*
Lvs. small, numerous ..... 3. *A. ascalonicum*
bb. Plants without prominent bulbs, perennial, growing in mats.. 4. *A. schoenoprasm*
aa. Lvs. flat.
c. Lvs. narrowly linear, up to 5 mm. broad: infl. usually bulbiferous.
Plant wild: fls. pink or rose-purple..... 5. *A. macrostemon*
Plants cultivated.
Spathes short, mucronate: fls. white ..... 6. *A. tuberosum*
Spathes long-beaked: fls. purple ..... 7. *A. sativum*
cc. Lvs. large, over 20 mm. broad: infl. not bulbil-bearing .. 8. *A. porrum*

1. **Allium cepa** Linn. Common Onion 洋葱 (Yang Ts'ung; Foreign Onion) (B.M.246). Stout, hollow stem, 3–6 dm. tall; fls. white, V–IX. Western Asia; locally in An., Ku. Cultivated, food.
2. **Allium fistulosum** Linn. Welsh Onion 葱 (Ts'ung; Onion) (B.M.245). Stout, hollow stem, 3–5 dm. tall; fls. white. Asia; locally in Ku. Cultivated, food.
3. **Allium ascalonium** Linn. Shallot 粉葱 (Fên Ts'ung; Meal-onion) (B.M.246). Slender, 2–4 dm. high; fls. white or violet. Cultigen; locally in Ku. Cultivated, food.
4. **Allium schoenoprasm** Linn. Chive (B.M.246). Tufted; fls. rose-purple. Eurasia; locally in Ku. Cultivated, food.
5. **Allium macrostemon** Bunge 華葱 (Hua Ts'ung; Chinese Onion) (Bunge 65). Slender, to 8 dm. high; fls. pink-rose-purple, V–VII. Eastern Asia; locally in Che., Ku Grassland.
6. **Allium tuberosum** Roxb. White-flowered Garlic 韭菜 (Chiu Ts'ai; Leek) (H.F. 6:343). Lfy. at base, 3–5 dm. high; fls. white, IX; fr. X; lvs. shorter than the scape. Eastern Asia; locally in Che., Ki., Ku. Cultivated, food. Fig. 478.
7. **Allium sativum** Linn. Purple-flowered Garlic 大蒜 (Ta Suan; Great Garlic) (B.M.247). Small plant; fls. pink; bulbs of several parts. Introduced from Europe; locally in Ku. Cultivated, food.
8. **Allium porrum** Linn. Leek 韭葱 (Chiu Ts'ung; Leek Onion) (B.M.246). Stout biennial; fls. pink. Eurasia; locally in Ku. Cultivated, food.

8. **Lilium** Linn. Lily 百合属 (Pai Ho Shu)

Perennial erect *leafy-stemmed* herbs from scaly *bulbs*: fls. large, often pendulous, solitary or in clusters: perianth of separate segments, corolline; each segment with a nectar-groove at the base; *anthers versatile*; filaments slender: fr. a subcylindric loculicidal many-seeded capsule. 100 species, in north temperate regions; 35 in China. (The Latin name, from the Greek word *lirion*, which is applied to a subdivision of the genus.)

Key to the Species

a. Lvs. long-petiolate; blades oblong-ovate, 10–20 cm. long, reniform-cordate at base..... 1. *L. cathayanum*
aa. Lvs. sessile or nearly so; blades mostly linear or lanceolate.
b. Fls. trumpet-shaped: perianth segments spreading at the apex; stamens not divergent ..... 2. *L. brownii* var. *colchesteri*

bb. Fls. radiate: perianth segments strongly recurved from about the middle; stamens divergent.
Bulbils present in the lf. axils: fls. orange or salmon red with dark purple spots ..... 3. *L. tigrinum*
Bulbils wanting in the lf. axils.
Fls. orange-red, sometimes purple-spotted, 4–6 cm. in diam. 4. *L. callosum*
Fls. white, with reddish-purple spots, 7–10 cm. in diam. .. 5. *L. speciosum*

1. **Lilium cathayanum** Wilson (Wils.L.99). Stout herb, 6–13 dm. high; fls. creamy or greenish white. Eastern and central China; locally in An., Che., Hun., Hup., Ki., Ku. Forest.
2. **Lilium brownii** F. E. Brown var. **colchesteri** Wilson 百合 (Pai Ho) (B.M.227). Stout, erect, to 1 m.; fls. white, tinged brown, VII–VIII. China; locally in An., Che., Hun., Hup., Ki., Ku. Woodland. Fig. 479.
3. **Lilium tigrinum** Ker Tiger Lily 卷丹 (Chuan Tan; Roll-of-red) (B.M.230). Stout, erect, to 1.5 m. tall; fls. orange-red, spotted purple-black, VII–VIII. Eastern Asia; locally in Che., Hup., Ki. Woodland.
4. **Lilium callosum** Sieb. & Zucc. (B.C.1874). Slender, 3–6 dm. high; fls. orange-red, VII; flg. bracts callose. Japan, China; locally in Ku. Grassland.
5. **Lilium speciosum** Thunb. Stag Lily 鹿子百合 (Lu Tzŭ Pai Ho) (Mak.F. 743). Stout, erect, to 2 m. high; fls. white, spotted rose-purple, VII–IX. Eastern Asia; locally in An., Che., Ki. Woodland.

9. **Fritillaria** Linn. Fritillary 貝母屬 (Pei Mu Shu)

Early-blooming *bulbous* perennial herbs with simple *stems*, few *lvs.* and pendulous fls.: *perianth* lily-like; the *segments with nectar cavities at the base*; *anthers basifixed*: fr. a many-seeded loculicidal 3-celled capsule. About 70 species, in the north temperate zone; 10 in China. (Latin: *fritillus*, dice box, probably referring to the square markings on the flowers of some species.)

1. **Fritillaria verticillata** Willd. var. **thunbergii** (Miq.) Baker 貝母 (Pei Mu; Mother-of-pearl) (B.H.315). Slender, to 8 dm. high; fls. cream-colored, purple-dotted, III–VI; lvs. with curled tips. Eastern Asia; locally in Ku. Moist meadows.

10. **Tulipa** Linn. Tulip 山慈菇屬 (Shan Tz'ŭ Ku Shu)

Early-blooming perennial herbs with simple stems, few lvs. and erect fls., from tunicated *bulbs*: *perianth segments without nectaries*; *anthers basifixed*: fr. a many-seeded loculicidal capsule. About 60 species, in Eurasia; 2 in China. (From the oriental word for "turban".)

Key to the Species

Lvs. narrowly linear, usually 2 ..... 1. *T. edulis*
Lvs. broadly lanceolate, usually 3 or more ..... 2. *T. gesneriana*

1. **Tulipa edulis** Baker 山慈菇 (Shan Tz'ŭ Ku; Mountain Sagittaria) (Mak.F.738). Weak herb, 10–20 cm. high; fls. pale yellow, tinged brown, III–IV. Eastern Asia; locally in Hup., Ku. Alluvial soil.
2. **Tulipa gesneriana** Linn. Common Tulip 鬱金香 (Yü Chin Hsiang; Cucurma Fragrance) (B.M.220). Erect, 15–30 cm. tall; fls. yellow, white or red, with purple-black

center, IV. Eurasia; locally in Ku. Planted, ornamental.

11. **Scilla** Linn. Squill 綿裹兒属 (Mien Tsao Êrh Shu; Soft-jujube Genus)

Low perennial herbs with narrow *basal lvs.* from tunicated *bulbs*: fls. many, small, in a terminal raceme on a *leafless scape*: *perianth* soon deciduous; the *segments distinct to the base*; anthers dorsifixed: capsule 3-lobed: seeds few in each cell. 100 species, in temperate regions; 2 in China. (The ancient Greek and Latin name.)

1. **Scilla sinensis** (Lour.) Merr. (*S. chinensis* Benth.; *S. japonica* Baker, non Thunb.) Crow Garlic 地棗子 (Ti Tsao Tzŭ; Ground-date) (Mak.F.737; M.L.107). Slender, erect, to 3 dm. high; fls. pink, IX; fr. X. China, Korea; locally in An., Che., Ku. Brushland.

12. **Hyacinthus** Linn. Hyacinth 風信子属 (Fêng Hsin Tzŭ Shu)

Low perennial herbs with narrow basal lvs. from large tunicate *bulbs*: fls. many, in a terminal raceme on a *leafless scape*: *perianth* persistent; the *segments united at the base*; anthers dorsifixed: capsule 3-lobed, loculicidal. About 30 species, Mediterranean region to southern Africa; one cultivated in China. (An early Greek name.)

1. **Hyacinthus orientalis** Linn. Common Hyacinth 風信子 (Fêng Hsin Tzŭ; Spirit-of-fidelity) (B.M.234). Stout, erect, 20 cm. high; fls. variously colored, III. Introduced from southeastern Europe; locally in Ku. Planted, ornamental. Fig. 480.

13. **Paris** Linn. Love-Apple 王孫属 (Wang Sên Shu; Royal-descendants Genus)

Erect perennial herbs from creeping *rhizomes*: stems simple, with a single *whorl of 4–9 ovate or lanceolate lvs.* at the top: fls. solitary and erect, the pedicel arising from the center of the whorl of lvs.: perianth persistent, 8–12-merous; the outer whorl ovate or cuneate, herbaceous; the inner whorl linear or subulate, petaloid; stamens as many as the perianth segments (8–12); anthers basifixed: *fr. a berry* (ours) or a loculicidal capsule. About 20 species, in Eurasia; 10 in China. (Probably from the Latin: *par*, equal, referring to the agreement in number between leaves and floral parts.)

1. **Paris poyphylla** Sm. 七葉一枝花 (Ch'i Yeh I Chih Hua; Seven-leaves-one-flower) (B.H.534). Stout, erect, 4–6 dm. high; fls. greenish, V; fr. X. Southeastern Asia; locally in Che., Hup., Ki., Ku. Moist woodland.

14. **Disporum** Salisb. Fairy Bells 寶鐸草属 (Pao To Ts'ao Shu)

Perennial, sparsely brg. herbs from creeping *rootstockes*: *lvs. alternate*, sessile, ovate: fls. greenish yellow, pendulous, on slender pedicels: perianth narrowly campanulate, deciduous; filaments thread-like, longer than the blunt anthers: *fr. a* 3–6 seeded red *berry*. 15 species, in North America and eastern Asia; 6 in China. (Greek: *di*, double, and *spora*, a seed, referring to the 2 ovules in each cell.)

Key to the Species

Fls. in many-fld. axillary umbels: lvs. oblong to lanceolate, acuminate 1. *D. cantoniense*
Fls. solitary or in pairs, axillary: lvs. ovate to broadly ovate, abruptly acute..... 2. *D. sessile*

1. **Disporum cantoniense** (Lour.) Merr. (*D. pullum* Salisb.) (H.F.6:360; M.L.109). Herb, to 1 m. high; fls. white, greenish or dull purple, V; fr. black, X. Southeastern Asia; locally in Hun., Hup. Woodland shade.
2. **Disporum sessile** D. Don 寶鐸草 (Pao To Ts'ao; Precious Bell) (Mak.F.732). Spreading, 4–6 dm. high; fls. light yellow, white or greenish, V; fr. X. Eastern Asia; locally in An., Che., Hup., Ku. Woodland shade.

15. **Rohdea** Endl. 万年青属 (Wan Nien Ch'ing Shu)

Low perennial *acaulescent* herb from a short thick rhizome: *lvs.* many, *broad and coarse*, basal: flg. scape shorter than the lvs., fls. in a dense terminal spike or head: perianth globose-campanulate: fr. a large red berry, usually 1-seeded. One species, in China and Japan. (For Dr. Rohde, German physician and botanist.) The national flower of the Manchus.

1. **Rohdea japonica** (Thunb.) Roth 万年青 (Wan Nien Ch'ing; Everlasting-green) (B.M.211). Stout, lvs. basal, scape 10–15 cm. high; fr. red, VIII–XII; lvs. broad, 4–6 dm. long. China, Japan; locally in An., Hup., Ku. Planted, ornamental.

16. **Reineckia** Kunth 吉祥草属 (Chi Hsiang Ts'ao Shu)

Leafy tufted perennial *acaulescent* herb from a thick creeping rhizome: *lvs.* grass-like, ribbed, *linear-lanceolate, soft*, in fascicles or scattered on the rhizome: flg. scape leafless, erect, solitary in a lfy. fascicle, bearing a loose spike of sessile fls.: perianth marcescent, tubular below, cleft above into spreading recurved segments; stamens 6, fixed on the perianth tube; ovary sessile, 3-celled: *fr. a* globular *berry* with one seed in each cell. One species, in China and Japan. (For J. Reinecke, a German gardener.)

1. **Reineckia carnea** Kunth 吉祥草 (Chi Hsiang Ts'ao; Good-luck Plant) (B.C.2916). Lvs. basal, scape 5–10 cm. high; fls. pale pink, VII–X. Japan, China; locally in Hup., Ku. Planted, ornamental. Fig. 481.

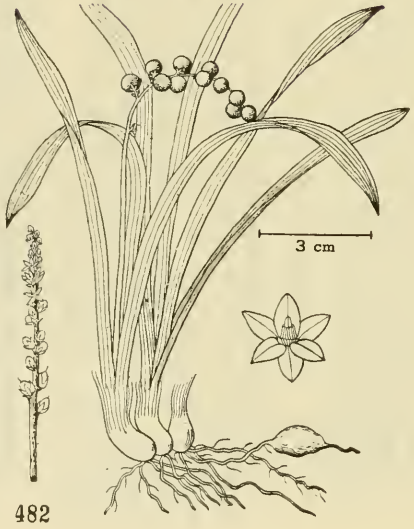
17. **Dianella** Lam. 桔梗蘭属 (Chieh Kung Lan Shu; Platycodon-orchid Genus)

Perennial rhizomatous herbs with hard *linear grass-like lvs.* crowded at the base of the stem, often 1 m. high: *fls. in spreading panicles*: perianth marcescent; segments 6, distinct, spreading; stamens 6; ovary 3-celled: *fr. a* blue *berry*. 12 species, in tropical Asia; one in China. (Diminutive of Diana, goddess of the hunt.)

1. **Dianella nemorosa** Lam. em. Schlittler (*D. ensifolia* DC. in Red.) (Mak.F.753; Blumea 6:216). Erect, to 1 m. high; fls. white, greenish or bluish, V–VI; fr. blue, VIII–IX. Subtropical Asia to Australia; locally in Che. Cliffs near the sea-shore.

18. **Liriope** Lour. Lily-Turf 麥門冬属 (Mai Mên Tung Shu)

Stemless glabrous evergreen perennial herbs with linear grass-like lvs.: *fls. in a spike-like raceme* terminating a leafless scape: *perianth obtuse or shouldered at the base*; pedicel jointed close to the perianth; stamens with *blunt anthers*, on long filaments; *ovary superior*, 3-lobed: *fr. a* globular or ovoid 1-seeded *berry*. 4 species, in Asia; 3 in China. (Latin: *Liriope*, a fountain nymph, the mother of Narcissus.)



481. Reineckia carnea
482. Liriope spicata

483. Ophiopogon japonicus
484. Polygonatum sp.

485. Smilax china
486. Hippeastrum johnsonii

KEY TO THE SPECIES

Lvs. broad, 10–12 mm. across, not longer than the scape ..... 1. *L. muscari*
Lvs. narrow, 4–6 mm. across, longer than the scape ..... 2. *L. spicata*

1. **Liriope muscari** (Decne.) Bailey BIG BLUE LILY-TURF (B.M.205). Lvs. basal, scapes to 8 dm. high; fls. lilac-purple, VI–VIII; fr. black, IX–X. China, Japan; locally in An., Che., Ki., Ku. Forest shade.
2. **Liriope spicata** Lour. CREEPING LILY-TURF 麥門冬 (Mai Mên Tung; Winter-wheat) (B.M.205). Lvs. basal; scapes 1–3 dm. high; fls. lilac-white, VI–VIII; fr. black, IX–X. Eastern Asia; locally in An., Che., Ki., Ku. Forest shade. Fig. 482.

19. **Ophiopogon** Ker LILY-TURF 沿階草屬 (Yen Chieh Ts'ao Shu)

Stemless narrow-lvd. evergreen sod-forming perennial herbs: *fls. in a spike-like raceme* terminating a leafless scape: *perianth tapering to a jointed pedicel*; stamens with *pointed anthers*, on short filaments; *ovary inferior*: *fr. a* blue one-seeded *berry*. About 20 species, in Asia; 5 in China. (Greek: *ophis*, serpent, and *pogon*, beard.)

1. **Ophiopogon japonicus** (L.f.) Ker DWARF LILY-TURF 沿階草 (Yen Chieh Ts'ao; By-the-steps Herb) (B.M.205). Lvs. basal; scapes 8–15 cm. high; fls. pale lilac, VI–VII; fr. blue, IX–X. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Forest shade. Fig. 483.

20. **Aletris** Linn. STAR-GRASS 粉条兜菜屬 (Fên T'iao Êrh Ts'ai Shu)

Scapose perennial bitter fibrous-rooted herbs with basal linear (ours) or lanceolate lvs.: fls. in an elongated spike-like raceme, terminating the scape: *perianth* oblong (ours) or campanulate, roughened and pubescent (ours) without, *shortly* 6-*cleft*, *adnate to the ovary* below: *fr. a* 3-celled many-seeded *capsule* enclosed by the persistent perianth. About 12 species, in eastern Asia and eastern North America; 10 in China. (Greek: *Aletris*, a female slave who ground corn, referring to apparent mealiness of the fls. in some species. The roots of our species produce abundant mycorrhizae.)

1. **Aletris spicata** (Thunb.) Franch. 粉条兜菜 (Fên T'iao Êrh Ts'ai; Vermicelli Plant) (Mak.F.726). Lvs. basal; scape to 8 dm. high; fls. pinkish, IV–V; ovary partly inferior. Eastern Asia; locally in An., Hon., Hup., Ki., Ku. Grassland.

21. **Polygonatum** Adans. SOLOMON'S SEAL 黃精屬 (Huang Ching Shu)

Leafy-stemmed perennial herbs from creeping knotted scarred rootstocks: stems naked below, bearing lvs. and fls. above: lvs. alternate or verticillate, ovate or lanceolate, nearly sessile or half-clasping, nerved: fls. pendulous, 1–several on axillary jointed pedicels: *perianth* tubular, greenish, *with* 6 *short* spreading *lobes*; stamens 6; ovary 3-celled: *fr. a* black or blue globular *berry*. 30 species, in the north temperate zone; 26 in China. (Greek: *polys*, many, and *gonatos*, knee, referring to the numerous joints of the rootstock.) Fig. 484.

1. **Polygonatum officinale** All. 黃精草 (Huang Ching Ts'ao; Yellow-essence Herb) (JLSB 14:554). Stout, leafy, to 8 dm. high; fls. white, tinged greenish, V–VI; peduncles short and stout. Eurasia; locally in An., Che., Ki., Ku. Forest shade.

A closely related form which may prove to be undescribed, occurs in Anhwei and Chekiang.

It differs from typical *P. officinale* in having very slender peduncles, 3–7 cm. long, and narrow lvs., 10–15 cm. long.

22. **Smilax** Linn. Green-Briar 菝葜属 (Pa Ch'ia Shu)

Deciduous or evergreen, *woody* or herbaceous *climbers*, rarely upright: stems usually prickly, climbing by means of coiled appendages of the petiole: lower lvs. reduced to scales; upper lvs. sometimes lobed, often blotched with gray or white: *fls. dioecious*, rather small, *in* axillary usually peduncled *umbels*; perianth segments 6, deciduous; stamens 6–15; ovary 3-celled: *fr. a* 1–several-seeded *berry*. 200 species, in temperate and tropical regions; 25 in China. (Ancient Greek name.)

Key to the Species

a.	Shoots herbaceous, not prickly, fr. black	1.	*S. herbacea*
aa.	Shoots woody.		
b.	Fr. red: stems more or less prickly.		
	Plants loosely branched; stem sparingly spiny: lvs. larger, deciduous in early autumn: sepals of male fls. obtuse: seeds angular	2.	*S. china*
	Plants diffusely branched; stem spiny: lvs. smaller, persistent until the approach of winter: sepals of male fls. acute: seeds globose	3.	*S. davidiana*
bb.	Fr. black.		
	Stems not prickly: lvs. lanceolate	4.	*S. glabra*
	Stems prickly: lvs. ovate.		
	Lvs. not cordate	5.	*S. glauco-china*
	Lvs. cordate or truncate at the base	6.	*S. sieboldii*

1. **Smilax herbacea** Linn. Carrion-Flower 土茯苓 (T'u Fu Ling; Native China-root) (G.M.449). Vine; fls. greenish, V–VII; fr. black, IX–X; shoots herbaceous. Eastern North America and eastern Asia; locally in An., Che., Ki., Ku. Brushland.
2. **Smilax china** Linn. 菝葜 (Pa Ch'ia) (R.M.896). Woody vine; fls. greenish, IV–VI; fr. red, IX–X; seeds angular. Eastern Asia; locally in An., Che., Ki., Ku. Shrubland. Fig. 485.
3. **Smilax davidiana** DC. (*S. china* Linn. var. *brachypoda* Rehd.) (Fa.B.3:112). Climbing woody vine; fls. yellowish green, IV–V; fr. red, VIII–IX; seeds globose. Eastern and central China; locally in An., Che., Hun., Ki., Ku. Woodland thickets.
4. **Smilax glabra** Roxb. (Be.F.369). Woody vine; fls. greenish, VIII; fr. black, IX. Southeastern Asia; locally in An., Che., Ki., Ku. Thickets.
5. **Smilax glauco-china** Warb. (Pl.W.3:5,8). Woody vine; fls. greenish, IV–V; fr. black, X. Central China; locally in An., Che., Ki., Ku. Woodland.
6. **Smilax sieboldii** Miq. 粘魚鬚 (Nien Yü Hsü; Cat-fish Whiskers) (R.M.895). Woody vine; fls. greenish, VI; fr. black, X. Eastern Asia; locally in Che., Ku. Woodland.

23. **Asparagus** Linn. 天門冬属 (T'ien Mên Tung Shu)

Plants perennial, erect or climbing, often woody at the base: *lvs. scale-like*, bearing in their axils clusters of filiform or linear (sometimes broad) flattened *cladodes*: polygamous or *dioecious*: *fls.* small, solitary or in axillary umbels or racemes; perianth segments sometimes united at the base; stamens 6: ovary 3-celled: *fr. a* 1–few-seeded *berry*. 150 species, in Asia, the Mediterranean region, and Africa; 10 in China. (Greek:

asparagos, a sprout, a shoot.)

Key to the Species

a. Stems erect: plants grown for food ..... 1. *A. officinalis*
aa. Stems climbing or drooping: ornamental plants.
b. Brs. forming flat frond-like sprays: "leaves" linear, short, very numerous, in small fascicles ..... 2. *A. plumosus*
bb. Brs. straggling, drooping or twining, not flattened: "leaves" linear or ovate.
"Leaves" (cladodes) ovate: branches twining ..... 3. *A. asparagoides*
"Leaves" (cladodes) linear: branches straggling.
Fls. unisexual: dioecious: fr. white or pink ..... 4. *A. lucidus*
Fls. perfect: fr. red ..... 5. *A. sprengeri*

1. **Asparagus officinalis** Linn. Garden Asparagus 石刀柏 (Shih Tao Pai) (B.M.216). Brushy herb, 1–2 m. high; fls. yellowish, V; fr. red, X. Eurasia; locally in Ku. Cultivated, food.
2. **Asparagus plumosus** Baker Fern Asparagus 文竹 (Wên Chu) (B.M.216). Climbing herb; fls. whitish, VIII; fr. purple-black. Introduced from South Africa; locally in Ku. Planted, ornamental.
3. **Asparagus asparagoides** Wight Smilax Asparagus (B.M.215). Trailing vines; fls. greenish white; fr. dark purple. Introduced from South Africa; locally in Ku. Planted, ornamental.
4. **Asparagus lucidus** Lindl. 天門冬 (T'ien Mên Tung) (Mak.F.735). Scrambling vine; fls. greenish white, V; fr. white, VIII. Eastern Asia; locally in An., Che., Hun., Ku. Brushland.
5. **Asparagus sprengeri** Regel (B.M.216). Scrambling vine; fls. pinkish, VI–VIII; fr. red, IX–X. Introduced from South Africa; locally in Ku. Planted, ornamental.

189. AMARYLLIDACEAE Amaryllis Family 石蒜科 (Shih Suan K'o)

Perennial *herbs* (ours), often scapose, usually from bulbs: lvs. alternate, mostly narrow and basal, entire: fls. usually bisexual, borne singly or in clusters from a spathe-like bract; perianth of 6 segments, in two whorls; the inner petaloid, united into a tube which is joined to the ovary below; *stamens 6*; anthers introrse; *ovary inferior*, 3-celled: fr. a capsule, rarely a berry. 80 genera with 800 species, in all warm countries; 9 genera and 20 species in China. Allied to Liliaceae, but easily separated by the inferior ovary.

Key to the Genera

A. Perianth without a conspicuous crown at the throat.
B. Tube of the perianth none, or shorter than the segments.
C. Fls. in umbels or racemes.
Fls. in umbels.
Peduncle hollow: fls. nearly regular ..... 1. *Hippeastrum*
Peduncle solid: fls. very irregular ..... 2. *Lycoris*
Fls. in racemes, nearly regular ..... 3. *Polianthes*
CC. Fls. solitary.
Fls. horizontal, quite irregular ..... 4. *Sprekelia*
Fls. erect, almost regular ..... 5. *Zephyranthes*
BB. Tube of the perianth long and slender, usually much exceeding

the segments ..... 6. *Crinum*
AA. Perianth with a crown which appears like an extra corolla ..... 7. *Narcissus*

1. **Hippeastrum** Herb. 馬星合 (Ma Hsing Ho)

Bulbous herbs with *hollow scape* and strap-shaped basal lvs.: *fls.* large and showy, *nearly regular*, 2-several in an umbel on top of the stout leafless scape; spathe of 2 separate valves; *tube of the perianth shorter than the segments*; stamens of 4 different lengths: fr. a 3-valved loculicidal capsule; seeds black, compressed. 60–70 species in tropics of the western hemisphere; one or more cultivated in China. (Greek: *hippeus*, horseman, and *astron*, star.)

1. **Hippeastrum johnsonii** Bury (B.C. 1494). Stout scape, 6–8 dm. high; fls. red, VI–VII; perianth segment with a white stripe on the keel. Hybrid; locally in Ku. Planted, ornamental. Fig. 486.

2. **Lycoris** Herb. Spider-Lily 石蒜屬 (Shih Suan Shu)

Bulbous herbs with *solid scape* and narrow basal lvs. which are gone before the fls. appear in late summer or autumn: *fls. in an umbel* at the top of the scape; perianth funnel-shaped, quite *irregular*; the segments oblanceolate, clawed, united into a short tube below; stamens inserted on the perianth segments near the throat; the filaments bent or curved: fr. a 3-celled capsule. About 6 species, in China and Japan; 5 in China. (Greek: the name of a sea nymph.)

Key to the Species

a. Stamens much longer than the perianth: perianth red; segments strongly recurved, 5 mm. wide and 30 mm. long, with crisped margins; tube very short; scales in throat very small: flg. scape 3–5 dm. high ..... 1. *L. radiata*
aa. Stamens about equal to the perianth: perianth variously colored; segments more or less recurved, 5–15 mm. wide, margins crisped or smooth; tube 5–50 mm. long; scaly corona sometimes wanting: flg. scape 5–10 dm. high.
b. Perianth segments with crisped margins; color pale yellow to almost white (rarely deep orange); scaly corona present, scales yellow or whitish: fls. 7–9 cm. long (4–5 cm. long in early-flg. form): flg. scape 6–8 dm. high ..... 2. *L. aurea*
bb. Perianth segments with smooth margins, variously colored.
With yellow-scaly corona at top of perianth tube; perianth rose-red, becoming tinged with lilac or blue; tube 12–20 mm. long; segments 12–17 mm. wide; fls. 6–9 cm. long..... 3. *L. squamigera*
Without scaly corona at top of perianth tube; segments 4–6 mm. wide, bright red; tube 6–10 mm. long: scape 4–5 dm. high: fls. 5 cm. long ..... 4. *L. sanguinea*

A form has been found in the vicinity of Shanghai which, though allied to *L. squamigera* differs from it in having perianth segments pure white; tube greenish, 40–50 mm. long, equaling the segments; fls. 10–11 cm. long. Upon further study this form may prove to be an undescribed species.

1. **Lycoris radiata** (L'Herit.) Herb. Red Spider-Lily 石蒜 (Shih Suan; Rock Garlic) (Mak.F. 722). Flg. scape before the lvs. 3–4 dm. high; fls. red, VIII–IX. Eastern

Asia; locally in An., Che., Ki., Ku. Moist woods and cultivated.

2. **Lycoris aurea** (L'Herit.) Herb. Golden Spider-Lily 忽地笑 (Hu Ti Hsiao) (B.M. 258). Lvs. before flg. scape, 3–6 dm. high; fls. yellow, VII–VIII. China; locally in Che., Hup., Ki., Ku. Moist woodland and cultivated. Fig. 487.
3. **Lycoris squamigera** Maxim. 鹿葱 (Lu Ts'ung; Stag Garlic. 夏水仙 Hsia Shui Hsien; Summer Narcissus) (B.M. 258). Lvs. before flg. scape, 4–6 dm. high; fls. pink, VIII. Eastern Asia; locally in An., Che. Moist woodland.
4. **Lycoris sanguinea** Maxim. 鉄色箭 (T'ieh Sê Chien; Iron-colored Arrow) (B.M. 179). Flg. scape before the lvs., 3 dm. high; fls. red, VIII. Eastern Asia; locally in Che., Ku. Moist shade.

3. **Polianthes** Linn. Tuberose 月下香属 (Yueh Hsia Hsiang Shu)

Tuberous-rooted herbs with grass-like lvs.: stems erect, more or less lfy., terminating in an extended bracteate *flg. raceme* or spike: *perianth with a long tube* and nearly equal segments; stamens inserted in the tube, and included: capsule bearing the persistent perianth; seeds flat. About 12 species in Mexico; one cultivated in China. (Greek: *polios*, shining or white, and *anthos*, flower.)

1. **Polianthes tuberosa** Linn. Tuberose 月下香 (Yuen Hsia Hsiang; Moonlight-fragrance) (M.F. 146). Stout and erect, 1–2 m. high; fls. white, fragrant, VII–X. Unknown wild; locally in Ku. Planted, ornamental. Fig. 488.

4. **Sprekelia** Heister. Jacobean-lily 詹姆蘭属 (Chan Mu Lan Shu)

Bulbous herbs with narrow basal lvs., appearing with the fls.: *fls. horizontal*, showy, bright red, *solitary*, at top of the hollow leafless scape: *perianth quite irregular, without tube*; but the lower segments rolled together for part of their length, and supporting the inner narrower segments; stamens attached to the base of the perianth segments, exserted, with large versatile anthers: fr. a 3-celled capsule; seeds disc-like, narrowly winged. One species, in Mexico, often cultivated. (For J. H. von Sprekelson, of Hamburg, who sent the plant to Linnaeus, and wrote on plants, died 1764.)

1. **Sprekelia formosissima** (L.) Herb. (B.M. 257). Flg. scape with the lvs., 3 dm. high; fls. red and yellow, VI. Introduced from Mexico; locally in Ku. Planted, ornamental.

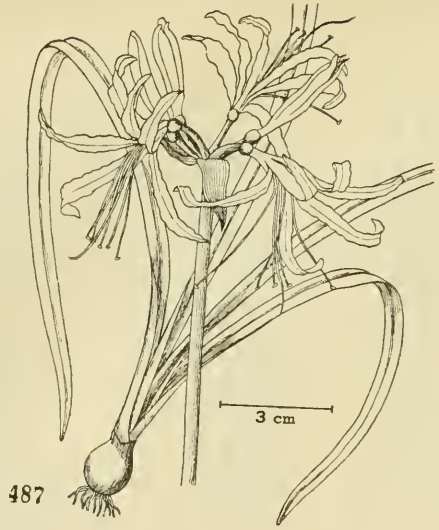
5. **Zephyranthes** Herb. Zephyr-Lily 玉簾属 (Yü Lien Shu)

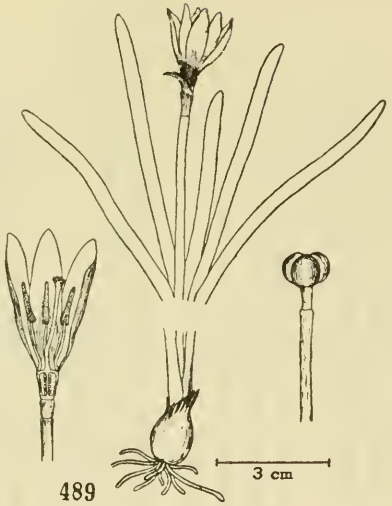
Small bulbous herbs with grass-like basal lvs.: *fls. almost regular, erect*, terminal, *one to each scape*, funnelform; *perianth segments united* below *into a short tube* (ours); fr. a subglobose loculicidal capsule. About 50 species, in warm parts of the New World; 3 cultivated in China. (Greek: *zephyr*, wind, and *anthos*, flower.)

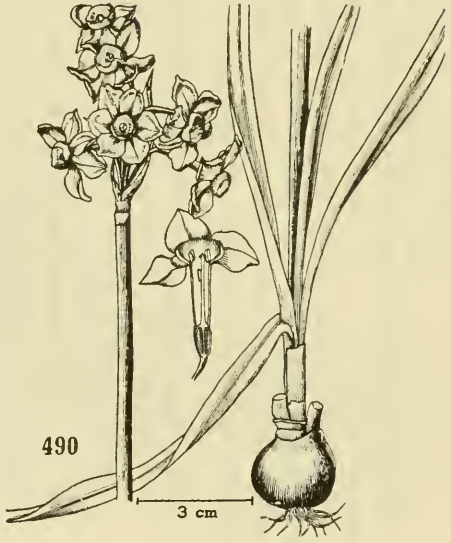
Key to the Species

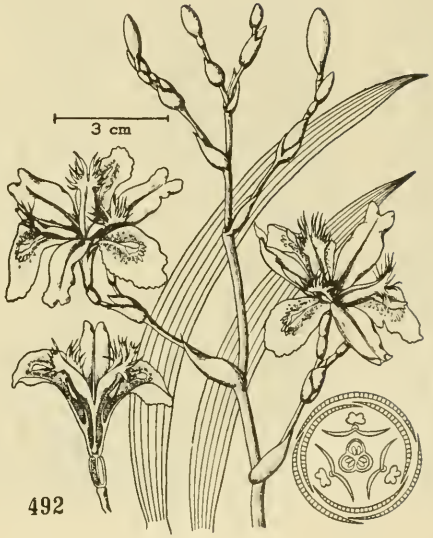
Stigmas lobed, not cleft; fls. white, often tinged red ..... 1. *Z. candida*
Stigmas 3-cleft; fls. rose-red ..... 2. *Z. carinata*

1. **Zephyranthes candida** (Lindl.) Herb. 玉簾 (Yü Lien; Jade Screen) (B.M. 254). Flg. scape with the lvs., to 4 dm. high; fls. white, IX–X. Introduced from South America; locally in Ku. Planted ornamental. Fig. 489.









487. Lycoris aurea
488. Polianthes tuberosa

489. Zephyranthes candida
490. Narcissus tazetta

491. Dioscorea opposita
492. Iris japonica

2. **Zephyranthes carinata** (Spreng.) Herb. 赛番紅花 (Sai Fan Hung Hua) (B.M. 254). Flg. scape with the lvs., to 4 dm. high; fls. rose-red, V–VI. Mexico, Central America, West Indies; locally in An. Planted, ornamental.

6. **Crinum** Linn. 文殊蘭属 (Wên Shu Lan Shu)

Large bulbous herbs with broad and long strap-shaped persistent lvs.: fls. in a 2-bracteate umbel at the top of a leafless scape; *perianth with a long-cylindric tube*, usually *much exceeding the* linear to oblong *segments*; stamens 6, attached on the throat of the perianth, with thread-like filaments and versatile anthers: fr. a subglobose dehiscent capsule with a few large seeds. 100 species, in warm regions; 2 in China. (Greek: *krinon*, lily.)

1. **Crinum asiaticum** Linn. St. John's Lily 文殊蘭 (Wên Shu Lan; God-of-wisdom Orchid) (B.M. 253). Lvs. strap-shaped, to 1 m. long; scape 1–2 m. high; fls. white or pink, VII–X. India to Malaya; locally in Ku. Planted, ornamental.

7. **Narcissus** Linn. 水仙属 (Shui Hsien Shu)

Plants from scaly bulbs, with basal lvs. and yellow or white fls. solitary or in umbels from a tubular spathe on the top of a leafless scape; *perianth* salverform and *bearing a* tubular or cup-shaped *crown or corona* appearing like an extra corolla near the junction of the more or less reflexed lobes of the perianth; stamens inserted in the tube; filaments mostly inserted: fr. a membranous loculicidal capsule. 25 or 30 species, in Eurasia; one cultivated in China. (Greek: *Narcissus*, son of the nymph Liriope, in Greek mythology, changed into the flower of that name.)

1. **Narcissus tazetta** Linn. Polianthus Narcissus 水仙 (Shui Hsien; Water Fairies) (B.M. 259). Flg. scape with the lvs., 2–3 dm. high; fls. white, yellow center, II. Eurasia; locally in Ku. Planted, ornamental. Fig. 490.

190. **DIOSCOREACEAE** Yam Family 薯蕷科 (Shu Yü K'o)

Twining or climbing *vines* (ours) rarely erect herbs or shrubs, with fleshy or woody roots: lvs. simple or digitate, ribbed and net-veined, petiolate: *fls.* small, *unisexual* or perfect, in axillary spikes, racemes or panicles; perianth 6-lobed; stamens 3 or 6; staminodes 0, 3 or 6; ovary 3-celled: *fr. a* 3-valved, *3-winged capsule* with winged seeds (ours), or baccate. 10 genera with 225 species, widely distributed; one genus with 25 species in China.

1. **Dioscorea** Linn. Yam 薯蕷属 (Shu Yü Shu; Tuber Genus)

Herbaceous *twining vines* with tuberous roots: stems often bearing aerial tubers: fr. a 3-winged capsule. 160 species, widely distributed; 25 in China. (In honor of Dioscorides, a famous Greek physician and botanist.)

Key to the Species

a. Lvs. alternate.
  Stems bulbiferous: lvs. cordate-ovate, acuminate-cuspidate, not lobed ..... 1. *D. bulbifera*
  Stems not bulbiferous: lvs. lobed or if entire then cordate-oblong, acuminate, glaucescent beneath.
    Frs. and lvs. (beneath) glaucescent: lvs. mostly entire, cordate-

oblong (sometimes ovate), acuminate ..... 2. *D. hypoglauca*
Frs. and lvs. green, not glaucescent: lvs. mostly 7-lobed, more or less cordate, acute or acuminate ..... 3. *D. nipponica* var. *rosthornii*

aa. Lvs. (or most of them) opposite.
Lvs. not lobed, ovate-lanceolate, acuminate, sometimes hastate; length mostly more than 2× the width ..... 4. *D. belophylloides*
Lvs. 3-lobed, ovate-deltoid, acute or cuspidate; length mostly less than 2× the width ..... 5. *D. opposita*

1. **Dioscorea bulbifera** Linn. Air Potato 金綿吊蝦蟆 (Chin Mien Tiao Hsia Mo; Toads-caught-with-golden-floss) (B.M. 262). Twining vine; fls. greenish white, VII. Tropical and subtropical Asia; locally in An., Che., Hun., Hup. Ki. Thickets.
2. **Dioscorea hypoglauca** Palibin (E.P. 87: 252). Twining vine; fr. VII. Eastern China; locally in Che., Ki., Ku. Forest shade.
3. **Dioscorea nipponica** Mak. var. **rosthornii** (Diels) Prain & Burk. (*D. giraldii* R. Kunth) (E.P. 87: 315). Twining vine; fls. greenish white, VII. China; locally in An., Hup., Woodland shade.
4. **Dioscorea belophylloides** Prain & Burk. (E.P. 87: 268). Twining vine; fls. whitish, VII; fr. VIII-IX. Southeastern Asia; locally in An., Che., Hun., Ki. Thickets.
5. **Dioscorea opposita** Thunb. (*D. batatas* Decne.*) Chinese Yam 家山藥 (Chia Shan Yao; Domesticated-mountain-medicine) (B.M. 262). Twining vine; fls. greenish, VI-VII; fr. VII-VIII. China; locally in An., Che., Ku., Hun., Hup. Thickets and cultivated, food, medicine. Fig. 491.

* According to Burkill in a letter to Merrill, dated III/22/1926.

191. **IRIDACEAE** Iris Family 鳶尾科 (Yüan Wei K'o)

Perennial herbs (ours), often from thickened rootstocks or corms, rarely shrubs, with mostly basal, *equitant*, linear *lvs.*: fls. usually showy, perfect, each with 2 spathe-like bracts, usually opening one or two at a time; perianth of 6 petaloid segments in 2 series, joined in a tube and adnate to the ovary below; stamens 3; anthers extrorse; *ovary inferior*, 3-celled: fr. a capsule. About 60 genera with 1,000 species, widely distributed; 5 genera and 20 species in China.

Key to the Genera

A. Style branches petal like ..... 1. *Iris*
AA. Style branches not petal-like.
B. Fls. more than one from each spathe on the main axis of the infl. 2. *Belamcanda*
BB. Fls. only one from each spathe.
Perianth very irregular ..... 3. *Gladiolus*
Perianth nearly regular.
Style branches simple ..... 4. *Tritonia*
Style branches bifid ..... 5. *Freesia*

1. **Iris** Linn. Fleur-de-lis 鳶尾属 (Yüan Wei Shu)

Herbs with sword-shaped or grass-like equitant lvs. and large showy fls.: outer perianth segments reflexed, the inner smaller and erect; stamens distinct, inserted at the base of the outer perianth segments; anthers linear or oblong, covered by the over-arching *petal-like style-brs.*; most of the style connate with the perianth segments

into a tube: capsule coriaceous. About 100 species, mostly in the north temperate zone; 20 or more in China. (Greek: *Iris*, rainbow.)

KEY TO THE SPECIES

a. Plant 5–15 cm. high: lvs. 2–4 mm. wide ..... 1. *I. rossii*
aa. Plants over 15 cm. high.
Pedicels longer than the spathe.
Lvs. 4–5 mm. wide: outer perianth segments not crested ..... 2. *I. ensata*
Lvs. 10–25 mm. wide; outer perianth segments with a fringed crest 3. *I. japonica*
Pedicels shorter than the spathe ..... 4. *I. tectorum*

1. **Iris rossii** Baker (B.H. 392). From slender rhizomes, 5–15 cm. high; fls. white, pinkish or bluish, III–IV. Northern Asia; locally in An., Ku. Grassy slopes.
2. **Iris ensata** Thunb. 蠡實 (Li Shih; Wormy-hard-fruit) (B.M. 276). Tufted, 2–3 dm. high; fls. lilac-purple, IV; fr. VII; lvs. long and narrow. Asia; locally in An., Ki., Ku. Grassland.
3. **Iris japonica** Thunb. 蝴蝶花 (Hu T'ieh Hua; Butterfly Flower) (B.M. 270). From stout rhizomes, 3–4 dm. high; fls. blue, IV; fr. VII; lvs. broad, falcate. Eastern Asia; locally in Che., Hun., Ku. Damp banks. Fig. 492.
4. **Iris tectorum** Maxim. 鳶尾 (Yüan Wei; Kite-tail) (B.M. 270). Erect, from rhizomes, 4–8 dm. high; fls. large, blue or lilac, IV. China, Japan; locally in Ku. Planted, ornamental.

2. **Belamcanda** Adans. LEOPARD FLOWER 射干屬 (Shê Kan Shu)

Erect herb from a stout rhizome; lvs. 2-ranked, lanceolate, vertical; lower ones large, becoming smaller upward: infl. a many-fld. dichotomous corymb with pedicels exserted: *fls. several from each spathe*; perianth segments orange, spotted red, oblong, the three inner twisting spirally as they fade; stamens 3, attached at base of the perianth segments; anthers basifixed: fr. a club-shaped loculicidal capsule with large *round shining black seeds*. One species, in eastern Asia. (The East Indian name.)

1. **Belamcanda chinensis** (L.) DC. BLACKBERRY LILY 射干 (Shê Kan) (B.M. 279). From stout rhizomes, to 1 m. high; fls. orange, red-spotted, VII; fr. IX. Eastern Asia; locally in An., Che., Hun., Hup., Ki., Ku. Brushland. Fig. 493.

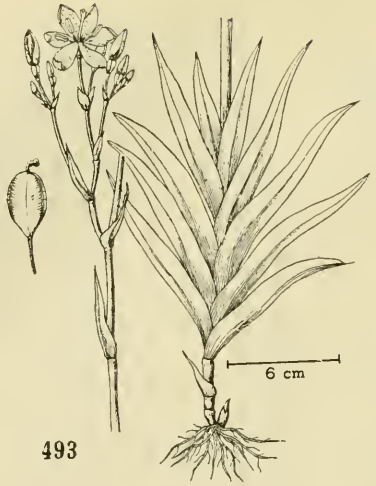
3. **Gladiolus** Linn. 唐菖蒲屬 (T'ang Ch'ang P'u Shu; Chinese Sweet-flag Genus

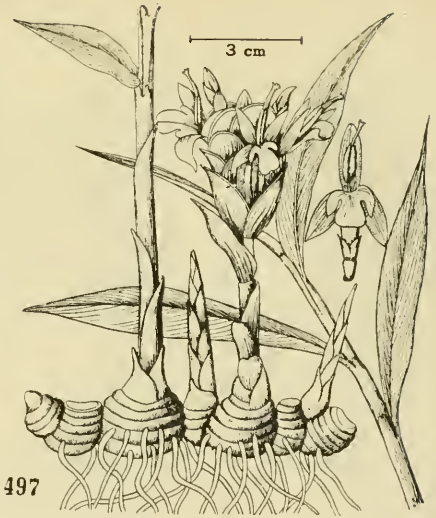
Erect herbs bearing corms, with large showy fls. in spikes from *long spathes* on lfy. stems: perianth tubular or funnel-shaped; *segments very unequal*, narrowed at the base; stamens inserted on the perianth tube: capsule large, oblong or obovoid, loculicidal; *seeds flattened or winged*. 200 species, in the Mediterranean region and Africa; 2 or 3 cultivated in China. (Latin: *gladius*, a sword, from the shape of the leaves.)

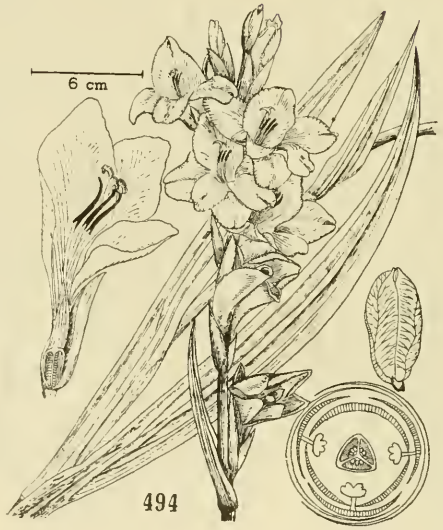
1. **Gladiolus lemoinei** Hort. (B.M. 283). Stout herb, to 1 m. high; fls. variously colored, V–VII; spathes 4–6 cm. long. Introduced hybrid; locally in Ku. Planted, ornamental. Fig. 494.

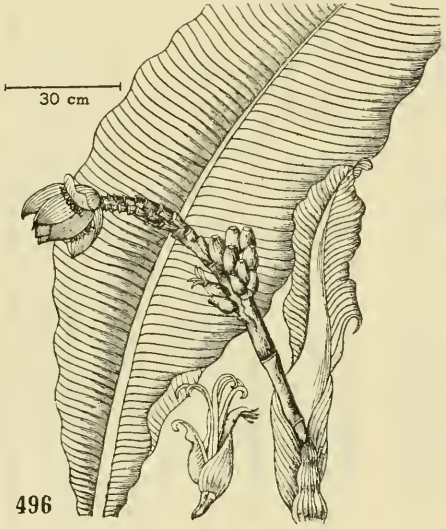
4. **Tritonia** Ker 英蘭屬 (Ying Lan Shu; Superior-orchid Genus)

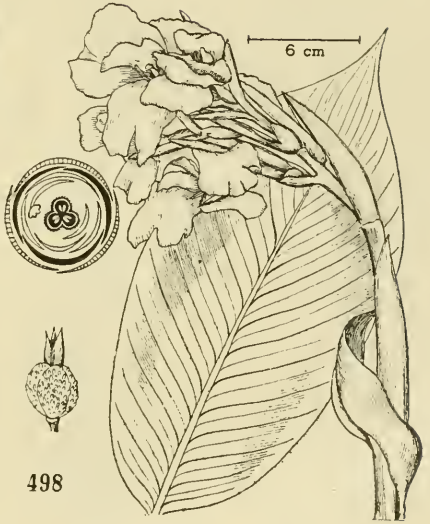
Erect corm-bearing herbs with branching stems and many sheathing sword-shaped











493. Belamcanda chinensis
494. Gladiolus lemoinei

495. Freesia refracta
496. Musa basjoo

497. Zingiber officinale
498. Canna generalis

lvs. mostly at the base: infl, brg.; the fls. sessile in *short spathes*; perianth tube narrow below, dilated above; *segments nearly equal*; stamens inserted on the perianth at the base of the funnel; *style brs. simple*: fr. an oblong or obovate membranous loculicidal capsule. 50 species in South Africa; one cultivated in China. (Greek: *Triton*, name of a sea demigod.)

1. **Tritonia crocosmaeflora** Lemoine (B.M. 284). Cormose, to 6 dm. high; fls. orange-crimson, VII. Introduced hybrid-France; locally in Che., Ku. Planted, ornamental.

5. **Freesia** Klatt 香雪蘭屬 (Hsiang Hsüeh Lan Shu)

Erect cormose herbs with narrow flat lvs. mostly at the base of the brg. stem: flg. spikes bent at right angles; the fls. very fragrant, all on the upper side of the axis: perianth tubular or funnel-shaped, with a slender tube which expands abruptly, somewhat unequally cleft; stamens about equaling the tube; *style brs. bifid*: fr. a small loculicidal capsule. 4 or 5 species, in South Africa; 2 cultivated in China. (After Elias Magnus Fries, 1794–1878, Swedish botanist.)

Key to the Species

Perianth segments bordered with rose-purple ..... 1. *F. armstrongii*
Perianth segments yellow or white ..... 2. *F. refracta*

1. **Freesia armstrongii** W. Wats. (B.M. 281). Cormose, to 3 dm. high; fls. white, orange base, purple border, IV; perianth about 4 cm. long. Introduced from South Africa; locally in Ku. Planted, ornamental.
2. **Freesia refracta** Klatt 香雪蘭 (Hsiang Hsüeh Lan; Fragrant-snow-orchid) (B.M. 281). Cormose, to 3 dm. high; fls. yellow or white, IV; perianth about 3 cm. long. Introduced from South Africa; locally in Ku. Planted, ornamental. Fig. 495.

192. **MUSACEAE** Banana Family 芭蕉科 (Pa Chiao K'o)

Tree-like perennial *herbs*, the "trunk" formed of fleshy overlapping lf. sheaths: lvs. very large, entire, pinnately nerved, parallel-veined; blades ovate, lanceolate or oblong: infl. spicate or paniculate, bracteate, subtended by heavy spathes; fls. bisexual or monoecious; *perianth* of 3 sepals and 3 petals; parts sometimes more or less united, *very irregular*; stamens 6, 1 sterile; *ovary inferior*, 3-celled: fr. a berry or capsule. 6 genera with about 100 species, in tropical regions; one genus and 7 species in China.

1. **Musa** Linn. 芭蕉屬 (Pa Chiao Shu; Fragrant Plantain Genus)

Very large tree-like herbs, with large *spirally arranged lvs.*, the clasping bases of which form the "trunk": lf. blades oblong, with prominent midrib: infl. in an erect or recurved terminal bracteate spike; the lower fls. pistillate; the upper ones staminate; calyx slit down one side to the base; corolla a single often 3-lobed petal-like limb; filaments stout; anthers linear, 2-celled: ovules many; seeds wanting in many cultivated forms. 50 or more species, in tropical regions; 7 in China. (Named after Antonio Musa, physician to Octavius Augustus, first emperor of Rome, 63–14 B.C.)

1. **Musa uranoscopos** Lour. (*M. coccinea* Andr.) (Mak.F. 710). Perennial herb; fls. VI–VII; infl. with showy red bracts. Southeastern Asia; locally in Ku. Planted, ornamental.

Nusa basjoo Sieb. & Zucc. (Japanese Banana), cultivated in Japan for fiber, is also grown as an ornamental in our area. (Fig. 496.) The male flowers 8–12 with one bract. (Mak.F.710)

193. **ZINGIBERACEAE** Ginger Family 薑科 (Chiang K'o)

Perennial herbs from often fleshy *aromatic* rhizomes, with simple stems and sheathing entire linear or elliptic usually distichous often ligulate lvs.: fls. bisexual, irregular, epigynous, often in dense bracteate spikes or heads: *perianth* of 6 parts in 2 *tubular* series; *fertile stamens 1*; *anther 2-celled*; ovules many: fr. a 3-valved loculicidal or sometimes indehiscent capsule; seeds small and numerous, often arillate. About 45 genera with over 800 species, in tropical regions; 8 genera and about 40 species in China.

1. **Zingiber** Adans. Ginger 薑屬 (Chiang Shu)

Perennial herbs with tuberous aromatic rhizomes: *lvs. distichous*, sheathing at the base; *sheaths split*; blades oblong-lanceolate: *infl.* spicate, usually *arising from the rhizomes* rather than terminating the lfy. stem: bracts of the infl. green or colored, imbricate, 1-several-fld.: corolla tube longer than the bract; *staminodes none*, or very small; connective of the anther prolonged into a curved spur: fr. a thin-walled capsule, 3-valved. 60 species, tropical Asia to New Guinea; 8 in China. (The ancient Greek or Latin name, from the Sanskrit name "sringavera".)

1. **Zingiber officinale** Roscoe Common Ginger 薑 (Chiang) (Mak.F. 708). From stout rootstocks, 8 dm. tall; fls. yellow-green, XI. Introduced from Pacific Islands; locally in Ku. Cultivated, condiment. Fig. 497.

194. **CANNACEAE** Canna Family 曇花科 (T'an Hua K'o)

Erect coarse perennial herbs with lfy. stems and fleshy rootstocks: lvs. alternate, with sheathing petioles; blades broad and entire: fls. in a terminal spike, showy, mostly red or yellow, very irregular: perianth of 2 whorls of 3's, sepal-like; staminodia petal-like, the conspicuous part of the fl.; one petal-like stamen, narrower than the others, bearing *a single fertile anther cell*; ovary inferior; style long, flattened or club-shaped: fr. a 3-valved pappilose, warty or bristly capsule bearing the persistent calyx; seeds globose, hard and black. One genus, in tropical America; cultivated in China.

1. **Canna** Linn. 曇花屬 (T'an Hua Shu; Vanishing-cloud-flower Genus)

Characters of the family. 50 or more species, some of them naturalized in Asia; 2 in China. (Latin: *canna*, a reed or cane.)

Key to the Species

Stems and lvs. glaucous: fls. in many colors, with 4 erect staminodes 1. *C. generalis*
Stems and lvs. purplish or brownish purple: fls. scarlet, often tinged blue, with 2–3 erect staminodes ..... 2. *C. warscewiczii*

1. **Canna generalis** Bailey Common Garden Canna 美人蕉 (Mei Jên Chiao; Beautiful-lady Plantain) (Mak.F. 707). Stout, erect, 1–1.5 m. high; fls. in many colors, VII. Introduced hybrid-garden origin; locally in Ku. Planted, ornamental. Fig. 498.
2. **Canna warscewiczii** Dietr. 美洲曇花 (Mei Chou T'an Hua; American Canna)

(B.M. 291). Stout, erect, 1.5–2 m. high; fls. scarlet, often tinged blue. Introduced from tropical America; locally in Ku. Planted, ornamental.

195. **BURMANNIACEAE** Burmannia Family 雞錫杖科 (Ch'u Hsi Chang K'o)

Erect herbs with lanceolate, linear or scale-like lvs.: *fls. regular*, in 1-sided spikes or racemes: perianth persistent, 3 or 6-lobed; anthers 3 or 6, 2-celled, sessile on the perianth; ovary inferior, 3-celled or 1-celled with 3 parietal placentae: *fr.* a *winged* capsule (ours); seeds numerous, minute. About 10 genera with over 50 species in tropical countries; one genus and 5 species in China.

1. **Burmannia** Linn. 雞錫杖屬 (Ch'u Hsi Chang Shu)

Annual herbs: lvs. ensiform, linear or scale-like, mostly basal: *stems* simple or brg., *lfy. below*; fls. solitary or few: perianth tube winged or angled; the limb 3-lobed; *anthers 3*; *ovary 3-celled*; style 3-lobed: capsule *winged* in *fr.* About 20 species, in tropical countries; 5 in China. (Named for J. Burmann, 1706–1779, a Dutch botanist.)

1. **Burmannia coelestis** D. Don 雞錫杖 (Ch'u Hsi Chang; Tin-bird-staff) (H.F. 5: 665). Lvs. reduced upwards; fls. blue, X; fr. winged. Southeastern Asia; locally in Ki. Moist meadows.

196. **ORCHIDACEAE** Orchid Family 蘭科 (Lan K'o; Refined Elegance Family)

Perennial herbs, (in our species) terrestrial, with fibrous or tuberous roots, or corms, (elsewhere) often epiphytic on trees or rocks with the stems much thickened and often forming a pseudobulb, or rarely saprophytic and leafless; inflorescence terminal or lateral, with flowers in spikes or racemes (rarely solitary) and often showy; perianth irregular, 6-parted, in 2 whorls (analagous to calyx and corolla), *one member of the inner whorl, which is distinctive by reason of size, shape or markings, is called the lip* and is often prolonged at base into a sac or spur; *stamens and style united into a central organ, the column or gynostemium*, opposite the lip, on which is borne the usually 1-or rarely 2-celled anther bearing *pollen usually in closely cohering masses* (*pollinia*); ovary inferior, 1-celled, the ovules borne on 3 parietal placentae; fruit a capsule with very numerous minute seeds.

Over 450 genera with upwards of 15,000 species, mostly in hot, warm or temperate countries (most numerous in tropical regions); 85 genera with more than 280 species in China.

The descriptions for Orchidaceae have been rewritten and the keys reconstructed by Charles Schweinfurth.

The following key, with the descriptions of the genera, is based exclusively upon species growing in the region of the Lower Yangtze Valley.

Key to the Genera

A. Fertile anthers 2, one on either side of the column; lip pouch-shaped or slipper-shaped ..... 1. *Cypripedium* (Cypripedilum)

AA. Fertile anther solitary, on the central axis of the column; lip (in our species) never pouch-shaped.

B. Inflorescence terminal, racemes on a more or less leafy stem.

C. Lip with a distinct, usually elongate, spur at its base.

D. Gland of the caudicles of the pollinia conspicuously enclosed in a little sac or bursicle.
E. Leaf solitary; lateral lobes of lip well-developed; plant small, rarely up to 24 cm. tall ..... 2. *Amitostigma*
EE. Leaves 2 or 3; lateral lobes of the lip abbreviated, at most dentiform to shortly subquadrate; plant larger, 23–47 cm. high ..... 3. *Perularia*
DD. Gland of the caudicles of the pollinia naked, i.e. not or only partly enclosed in a sac (including *Coeloglossum, Gymnadenia, Platanthera*) ..... 4. *Habenaria*
CC. Lip without a distinct or elongate spur, although sometimes concave-saccate at the base.
F. Lateral lobes of the lip linear, much surpassing the minute mid-lobe ..... 5. *Herminium*
FF. Lateral lobes of the lip, if present, short and broad.
G. Flowers in a spiral or secund raceme; lip simple when expanded.
H. Roots solitary at the nodes of a creeping stem-like rhizome; leaves with whitish reticulations; flowers few to several, relatively large (about 1 cm. long).. 6. *Goodyera*
HH. Roots fascicled at the base of the stem; leaves wholly green; flowers numerous, very small (about 5 mm. long) 7. *Spiranthes*
GG. Flowers not in a spiral or secund raceme.
I. Lip sharply 3-lobed.
J. Leaves scattered along the stem up to the in florescence; flowers usually yellow; lip with a triangular-saccate basal portion 8. *Cephalanthera*
JJ. Leaves congested on the lower (rarely middle) portion of the stem; flowers usually red to purple; lip without a saccate basal portion ..... 9. *Bletilla*
II. Lip simple; plants with a pair of broad opposite leaves near the base.... 10. *Liparis*
BB. Inflorescence lateral, racemes on leafless, sheathed scapes borne in the axils of leaves or sheaths or from the side of a corm.
K. Plants forming a sympodium, i.e. with stems caespitose, manifestly terminated by apical, usually smaller, leaves (*Sympodiales*).
L. Leaves convolute in the bud, lamina commonly plicate; flowers relatively small, sepals 1 cm. long; lateral lobes of the lip linear ..... 11. *Oreorchis*
LL. Leaves conduplicate; flowers large, sepals 2 cm. or more long; lateral lobes of the lip short, broad, rounded ..... 12. *Cymbidium*
KK. Plants forming a monopodium, i.e. with unlimited growth at the apex and growing on from year to year (*Monopodiales*) ..... 13. *Luisia*

1. **Cypripedium** Linn. Lady's slipper 老虎七属 (Lao Hu Ch'i Shu; Tiger-root-tonic Genus)

Erect terrestrials, in our species with creeping rhizomes; stem stout, sheathed at base, bearing leaves which are subopposite (in this region), very broad and plicate-veined: flowering peduncle naked, 1-flowered; flower large, leafy-bracted; sepals broad; petals narrower, flat or somewhat twisted; *lip* large, *pouch-shaped or slipper-shaped*, white, veined with purple.

A rather large genus of cosmopolitan distribution in temperate regions, with about 50 species; 27 in China. (Greek: *Cypris*, Venus, and *pedilon*, shoe.) *Cripripedilum* Aschers.

1. **Cypripedium cathayanum** Chien* (Sc.C.6:23) Plant 37–42 cm. high; *leaves 2, subopposite*, near the middle of the stem, suborbicular to transversely oval, up to 15 cm. long and 16.5 cm. broad; flower large, solitary, light yellow, with a white, purple-veined, shoe-shaped lip. China; locally in Che. Fig. 499.

*Recorded by Chien as *Cypripedilum cathayenum*

2. **Amitostigma** Schltr. 假羽蝶蘭属 (Chia Yü Tieh Lan Shu; False Gymnadenia)

Slender terrestrials, with 1 or more globose-ovoid or elliptic tuberoids; *leaves solitary in our species, near the base of the stem*, broadly oblong or elliptic-oblong; peduncle filiform; raceme few-to many-flowered; flowers small with free but somewhat connivent segments; lip protruding, 3-lobed, produced at the base into a slender, short, spur; column abbreviated, with stigma having 2 filiform arms adnate to the base of the lip.

A small genus of about 18 species, confined to China, Formosa and Japan; 14 in China. (Name derived from Greek words referring to the thread-like arms of the stigma.) *Mitostigma* Bl.

1. **Amitostigma chinensis** (Rolfe) Schltr. (*Cynosorchis chinensis* Rolfe) (JLSB38:369). Slender tuberous herb, 4.5–24.5 cm. high. China; locally in An., Ki. Moist shady banks or cliffs. Fig. 500.

3. **Perularia** Lindl. 竹葉蘭属 (Chu Yeh Lan Shu; Bamboo-leaf-orchid Genus)

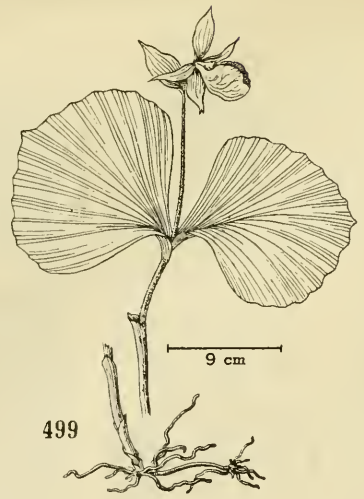
Small group of terrestrials, bearing several or (in our species) commonly 2 *or* 3 *leaves near the middle of the stem* and terminal inflorescences; flowers small, green; lip with obscure or abbreviated lateral lobes at the base, and a slender spur surpassing the lip; pollinia with the base enclosed in a sac or bursicle. 4 species in China.

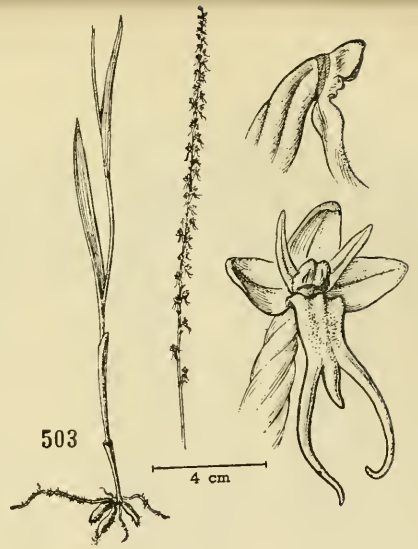
Key to the Species

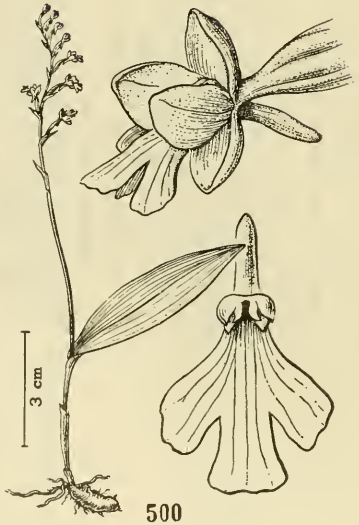
Leaves dissimilar, the lower oblanceolate-oblong and the upper narrowly elliptic-lanceolate; spike rather densely 20- to 25-flowered; spur up to 6 mm. long ..... 1. *P. ussuriensis*

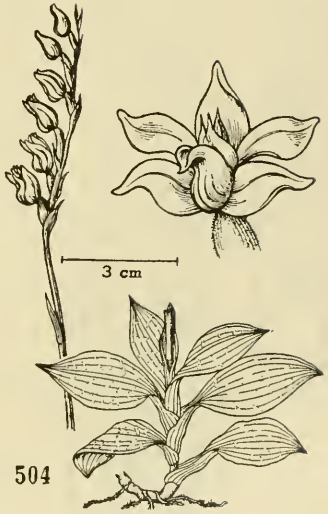
Leaves similar, the lower elliptic-oblong and the upper oblong to linear; spike loosely 10-to 14-flowered; spur about 16 mm. long 2. *P. whangshanensis*

1. **Perularia ussuriensis** (Maxim.) Schltr. (*Platanthera ussuriensis* Maxim.) 烏蘇里竹葉蘭 (Wu Su Li Chu Yeh Lan; Ussuri Perularia) (Sc.C.6:87). Plant erect, 30–47 cm. high; leaves 2; flowers greenish, rather dense, numerous. Japan, Korea,









499. Cypripedium cathayanum
500. Amitostigma chinense

501. Perularia ussuriensis
502. Habenaria minor

503. Herminium angustifolium
504. Goodyera schlechtendaliana

China; locally in An., Che., Hup., Ki., Ku. Moist grassland or moist and shady places. Fig. 501.

2. **Perularia whangshanensis** Chien (Sc.C.6:75). Plant erect, 23–32 cm. high; leaves 2 or 3; flowers green, loose, 10 to 14. China; locally in An. Open moorland.

4. **Habenaria** Willd. Rein Orchis 鹅毛玉凤花属 (Ê Mao Yü Fêng Hua Shu; Flat-petaled-white-balsam Genus)

A very large, cosmopolitan and polymorphic genus of terrestrials characterized by leafy stems (in our region), a terminal inflorescence and flowers bearing a spur at the base, the *pollinia* being *naked* and *not enclosed at base* in a sac or bursicle; the lip is either simple or more or less deeply 3-lobed or 3-parted.

About 600 species; 80 in China. (Latin: *habena*, a thong or rein, referring to the shape of the spur in some species.) *Coeloglossum* Hartm.; *Gymnadenia* R. Br.; *Platanthera* L.C. Rich.

Key to the Species

a.	Spur at base of lip abbreviated, scrotiform	1. *H. viridis* var. *bracteata*
aa.	Spur at base of lip elongate.	
b.	Lip simple, at most dilated below.	
c.	Leaves linear-lanceolate; lip not dilated near the base	2. *H. neuropetala*
cc.	Leaves oval to oblong or ovate (rarely oblanceolate).	
d.	Spur 5.–5.5 cm. long	3. *H. japonica*
dd.	Spur 2.9 cm. or less long.	
e.	Spike relatively short, 5–7 cm. long, loosely 5-to 10-flowered; spur 2.4–2.9 cm. long	4. *H. winkleriana*
ee.	Spike elongate, usually 9–30 cm. long, many-flowered; spur 1.8 cm. or less long.	
f.	Lower floral bracts much surpassing the flowers; spur slender-cylindric, 1.35 cm. or less long	5. *H. minor*
ff.	Lower floral bracts subequalling the flowers; spur filiform, 1.4–1.8 cm. long	6. *H. henryi*
bb.	Lip 3-lobed or 3-divided.	
g.	Leaves linear or linear-oblong, with essentially parallel sides.	
h.	Lip cuneate below, subequally 3-lobed above the middle with short rounded to quadrate lateral lobes	7. *H. conopsea*
hh.	Lip with a short linear base, then divided into very narrow lobes of which the lateral ones are more or less laciniate near the tip	8. *H. linearifolia*
gg.	Leaves ovate or elliptic to oblong-elliptic or lanceolate, without parallel sides.	
i.	Flowers relatively large (lateral sepals 9 mm. or more long); lateral lobes of lip much larger than the narrow mid-lobe; spur of lip much exceeding the ovary	9. *H. miersiana*
ii.	Flowers very small (lateral sepals 4 mm. or less long); lateral lobes of the lip narrower than the mid-lobe; spur of lip shorter than the ovary	10. *H. stenostachya*

1. **Habenaria viridis** (L.) R. Br. var. **bracteata** (Muhl. ex Willd.) A. Gray

(*Coeloglossum bracteatum* (Muhl. ex Willd.) Parl.) (G.M.470). Erect, rather stout, 1–40 cm. tall, with palmately divided tuberoids; flowers small, green, the lip often tinged with yellowish-brown to purple. North America, Europe, Siberia, Korea, Japan, China; locally in Hun., Shansi. Damp woods and thickets, rarely alpine meadows.

2. **Habenaria neuropetala** Miq. (*Platanthera hologlottis* Maxim.) 狭葉長距蘭 (Hsia Yeh Ch'ang Chu Lan) (Sc.C.6:101 as *Platanthera hologlottis* Erect terrestrial, 65–87 cm. high; flowers white. Japan, Korea, China; locally in Ku. Exposed swampy ground.
3. **Habenaria japonica** (Thunb.) A. Gray (*Platanthera japonica* (Thunb.) Lindl.) Sc.C.6:103). Erect, stout, terrestrial, 30–80 cm. high; fls. white. Japan, Korea, China; locally in Che., Hup., Ki. Open swampy places, roadsides or woodlands.
4. **Habenaria winkleriana** (Schltr.) C. Schweinfurth (*Platanthera winkleriana* Schltr.) (Sc.C.6:108). Erect terrestrial, 23–55 cm. tall; flowers greenish yellow, the spur being long for the alliance. China; locally in Ku. Swampy sandy slope.
5. **Habenaria minor** (Reichb.f.) C. Schweinfurth (*Platanthera minor* Reichb.f.) (Sc.C.6:106). Erect terrestrial, 15–80 cm. high; flowers greenish white or yellowish green. Japan, Korea, Manchuria, China; locally in An., Che., Hup., Ki., Ku. Grassy or bushy and shady slopes or in woods. Fig. 502.
6. **Habenaria henryi** Rolfe (*Platanthera henryi* (Rolfe) Krzl.) (K.B.1896:202). Erect terrestrial, 30–60 cm. high; fls. whitish, greenish or yellow. China; locally in An., Che., Hup., Ki., Ku. Swamps and open places.
7. **Habenaria conopsea** (L.) Benth., non Reichb. f.; (*Gymnadenia conopsea* (L.) R. Br.) (Mak.F.702). Erect, slender terrestrial, 22–55 cm. high; fls. purple-lilac, rarely white, in many-flowered spikes. Europe, Siberia, Japan, Korea, China; locally in Hup., Ki. Grassy places, pastures, moors.
8. **Habenaria linearifolia** Maxim. (*Habenaria sagittifera* Rolfe, non Reichb.f.) (Max.F.269;F.H.E.3:61). Erect, slender terrestrial, 33–80 cm. high; fls. greenish white or pinkish white. Japan, Manchuria, Korea, China; locally in An., Che., Ki. Moist meadows or grassy hillsides.
9. **Habenaria miersiana** Champ. ex Benth. (Be.F.363). Stout, erect terrestrial 30–79 cm. high; flowers white. Japan, Formosa, China; locally in Hup., Ki. Moist meadows, Shady banks or dry hillsides.
10. **Habenaria stenostachya** (Lindl.) Benth. (*Platanthera stenostachya* Lindl.) (Be.F.362). Slender, erect, 15–36 cm. high; flowers very small, white to yellow-green. China; locally in Ki. Forest shade, sometimes in grass.

5. **Herminium** Linn. 脚根蘭属 (Chio Kên Lan Shu; Foot-root-orchid Genus)

Slender, erect, low to medium-sized or large terrestrials, from 1–2 entire tuberoids; leaves 1 to several, linear or elliptic-linear (in our species); flowers very small (about 4 mm. or less long) in an open or dense short or elongate spike; lip slightly saccate at base (in our species), 3-lobed, lateral lobes linear.

About 35 species, in temperate Eurasia; 21 in China.

1. **Herminium angustifolium** (Lindl.) Benth. ex Hook.f. (*Aceras angustifolia* Lindl.) (H.F.6:129). Erect terrestrial, very slender, 18.5–66 cm. high; flowers green to white, VIII. India, China, Formosa, Japan, Java, Timor; locally in Hun., Ki. Grassy slopes or forest, rarely roadsides. Fig. 503.

6. **Goodyera** R. Br. Rattlesnake Plantain 斑葉蘭屬 (Pan Yeh Lan Shu)

Low to medium-sized, erect perennials rising from a *creeping stem-like rhizome*; leaves several, clustered near the base of the stem, ovate to elliptic, green, in our species marked with white reticulations; raceme few- to several-flowered, spiral to secund; lip simple, triangular-ovate, with the lower part deeply saccate and beset inside with filiform papillae.

A rather large cosmopolitan genus with about 30 species; 12 in China. (Named for John Goodyer, 1592–1664, British botanist.)

1. **Goodyera schlechtendaliana** Reichb.f. 斑葉蘭 (Pan Yeh Lan; Variegated-leaf Orchid) (Mak.F.690). Rather stout, 8–29 cm. tall; leaves green with white reticulations; raceme loosely spiral to secund; flowers large for the genus (about 1 cm. long), white to pink. Indo-China, China, Korea, Japan; locally in Ki. Damp grassy, brushy or forested slopes. Fig. 504.

7. **Spiranthes** L.C. Rich. Ladies' Tresses 綬草屬 (Shou Ts'ao Shu)

Terrestrial herbs rising from *a cluster of tuberous roots*: stem erect, commonly slender, leafy usually at or near the base, many-bracted above; leaves with narrow blades; flowers small, white, pink and white or reddish, horizontal, sessile, *in a twisted* (or more rarely secund) *raceme*; perianth bilabiate; lip short-clawed, ovate to broadly oblong, often more or less pandurate, dilated and crisped-undulate in front.

About 300 species, mostly in the temperate zones; one in China. (Greek words meaning spiral and flower, in reference to the twisted raceme.)

1. **Spiranthes sinensis** (Pers.) Ames (*S. australis* (R. Br.) Lindl.) 綬草 (Shou Ts'ao; Ribbon Herb) (Mak.F.692; M.E.1:268). Slender, erect, 6–74 cm. high; flowers red, pink or white, VI. India, Siberia, China, Japan, Indo-China, Malay Peninsula, Java, Sumatra, Philippine Islands, Borneo, New Caledonia, Australia, New Zealand, Tasmania; locally in An., Che., Hun., Ki., Ku. Moist grassland. Fig. 505.

8. **Cephalanthera** L.C. Rich. 金蘭屬 (Chin Lan Shu)

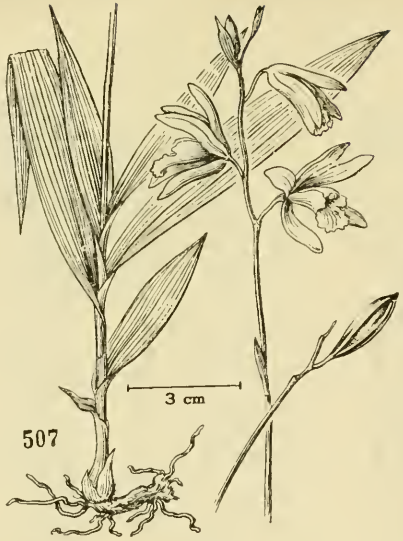
Erect terrestrials, commonly with leafy stems (as in our species) and fibrous roots: *leaves lanceolate to oblong-elliptic* (rarely oval), sessile, plicate; *flowers white* or greenish white, *yellow* (rarely purple), in a loose, few-flowered raceme; perianth segments of the two whorls more or less alike; lip with a triangular saccate or shortly spurred base.

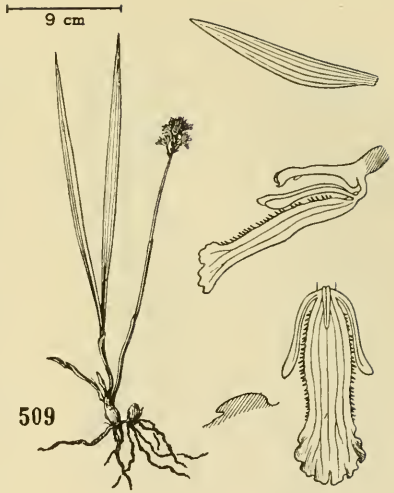
About 15 species, in north temperate regions; 4 in China. (Name derived from the Greek words meaning head and anther.)

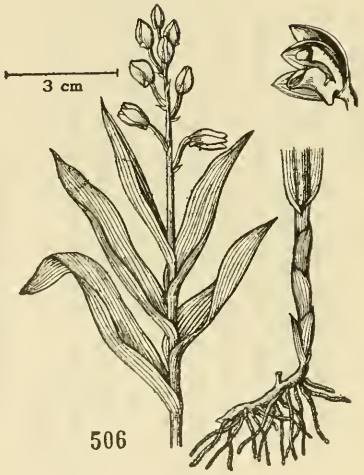
1. **Cephalanthera falcata** (Thunb.) Blume 金蘭 (Chin Lan; Golden Orchid) (Mak.F. 693). Rather slender herb, 12–60 cm. high; flowers yellow (rarely white, greenish white, or purple), IV. Korea, Japan, China; locally in An., Che., Ku. Bushy, rocky and shady places. Fig. 506.

9. **Bletilla** Reichb. f. 筆蘭屬 (Jo Lan Shu)

Erect, slender or stout terrestrials, rising from corms or pseudobulbous swellings on a short rhizome; stems with several *leaves congested near the base* or below the middle of the stem; leaves large, linear to lanceolate or oblong-elliptic (3–40 cm. long in our species); inflorescence loosely few-flowered, at the apex of a rather long, stiff peduncle; *flowers* medium-sized to large, with more or less spreading segments, *red-*







505. Spiranthes sinensis
506. Cephalanthera falcata

507. Bletilla striata
508. Liparis cucullata

509. Oreorchis intermedia
510. Cymbidium ensifolium

pink (in our species), often with white markings; lip 3-lobed, with the lateral lobes incurved and surrounding the column.

About 8 species, in eastern Asia and Japan; 4 in China. (Name a diminutive of *Bletia*, named for Louis Blet, a Spanish botanist.)

1. **Bletilla striata** (Thunb.) Reichb. f. (*Bletia hyacinthina* R. Br.) 筜蘭 (Jo Lan; Bamboo-leaf Orchid) (B.M.303). Small to large herbs, 15–62 cm. high; flowers red to violet or purple (rarely white or orange), V–VII. Tibet, Burma, Japan, China; locally in Che., Hup., Ki., Ku. Cliffs or mountain forest. Fig. 507.

10. **Liparis** L.C. Rich. 羊耳蘭属 (Yang Êrh Lan Shu; Goat-ear-orchid Genus)

A large, variable, cosmopolitan genus, terrestrial in our regions; plants commonly low and stout, with thickened or pseudobulbous base, *a pair of erect-spreading leaves* and a loosely few-flowered raceme; petals filiform; *lip* much the largest segment of the flower, *simple*.

About 300 species; 23 in China.

1. **Liparis cucullata** Chien (Sc.C.6:29). Plant low, stout, 14–20 cm. high; leaves 2, oval, subbasal; raceme loosely 8-to 9-flowered; flowers pale green with purple cuneate-obovate lip. China; locally in Che. On humus between rocks, in front of an old temple. Fig. 508.

11. **Oreorchis** Lindl. 山蘭属 (Shan Lan Shu; Mountain-orchid Genus)

A small genus of terrestrials limited to the Old World; stems short, thickened into a pseudobulb, 2-leaved in our region; leaves linear-lanceolate or elliptic-linear, erect; inflorescence lateral, bearing at the summit a short, dense raceme of small or medium-sized flowers; *sepals and petals narrow*, similar; lip spurless, 3-lobed.

About 16 species; 11 in China.

1. **Oreorchis intermedia** Chien (Sc.C.6:26). Plant slender, about 28 cm. tall; scape shorter than the leaves, densely many-flowered at the summit; flowers small, white and purplish, with purple-striate or-spotted lip. China; locally in Che., at side of old temple. Fig. 509.

12. **Cymbidium** Sw. 建蘭属 (Chien Lan Shu)

Tufted terrestrials or epiphytes, with a more or less abbreviated rhizome; stems very short and thickened, concealed by the imbricated bases of the leaves: *leaves conduplicate*, narrow or linear, crowded at the base: scapes lateral, leafless but more or less covered by sheaths, terminated by a loosely few-flowered raceme; *flowers* rather *large* and showy, often 4–5 cm. or more across, with distinct spreading segments in two nearly equal whorls; lip sessile, joined to the base of the arcuate column, more or less distinctly 3-lobed; disc commonly with 2 prominent ridges.

About 70 species, limited to the tropics and subtropics of the Old World; about 17 in China. (Greek word meaning boat, referring to the shape of the lip in natural position.)

1. **Cymbidium ensifolium** (L.) Sw. 建蘭 (Chien Lan; Fukien Orchid) (Be.F.357). Tufted; leaves up to over 83 cm. long; scape to 45 cm. long; flowers cream-colored to pale green or yellow (rarely whitish), usually with reddish brown stripes and

markings, fragrant, III. Ceylon, Java, Sumatra, Burma, Japan, China; locally in An., Che., Ki., Ku. Cultivated, ornamental. Fig. 510.

13. **Luisia** Gaud. 叉股蘭属 (Ch'ai Ku Lan Shu; Hair-pin-orchid Genus)

Epiphytic plants of the tropics; *stems* rather short, *growing on from year to year*, simple in our species, provided with few to several long terete leaves; inflorescence lateral, very short and few-flowered; flowers small or medium-sized; sepals and petals narrow, similar; lip simple (in our species) or 3-lobed, commonly concave at the base.

An Old World genus with about 40 species; 4 in China.

1. **Luisia hancockii** Rolfe 石蘭 (Shih Lan) (K.B.1896:199). Plant short, about 7.5–15 cm. high; racemes abbreviated, 2-to 3-flowered; flowers small, with subcordate-oblong, obtuse or emarginate lip. China; locally in Che. Growing on trees.

AUTHORS' NAMES

The names, usually abbreviated, of the botanical author who first acceptably described each genus, species and variety or subspecies is given in the manual. This list provides the full name, when available, and the dates of birth and death, if known. The country mentioned is that where the author resided during his active botanical career, not always that of his birth.

Adans. Michel Adanson, 1727–1806. Professor of Natural History, Transylvania University. France.
Ait. William Aiton, 1731–1793. Great Britain.
Ait. f. William Townsend Aiton, the son, 1766–1849. Great Britain.
Alef. Friedrich Alefeld, 1820–1872. Germany.
All. Carlo Allioni, 1725–1804. Italy.
Alston. Arthur Hugh Garfit Alston, 1902–1954. British Museum. England.
Ames. Oakes Ames, 1874–1950. Orchid specialist, Harvard University. U.S.A.
Anders. T. Thomas Anderson, 1832–1870. Director of Botanic Garden, Calcutta. India.
Anderss. Nils Johan Anderson, 1821–1880. Sweden.
Andr. Henry C. Andrews, died 1830. Botanical artist and engraver; conducted the Botanists' Repository from 1799–1811. Great Britain.
Arn. George Arnold Walker Arnott, 1799–1868. Scotland.
Aschers. Paul Friedrich August Ascherson, 1834–1913. Professor of botany, Berlin. Germany.
Aubl. Jean Baptiste Christophe Fusée Aublet, 1720–1778. France.

Babc. Ernest Brown Babcock, 1877–1954. University of California. U.S.A.
Babc. & Stebbins. Ernest Brown Babcock and George Ledyard Stebbins, Jr.
Backer. Cornelius Andries Backer, 1874– . Holland.
Bailey. Liberty Hyde Bailey, 1858–1954. Cornell University. U.S.A.
Baill. Henri Ernest Baillon, 1827–1895. France.
Baker. John Gilbert Baker, 1834–1920. Botanic Gardens, Kew. England.
Banks. Sir Joseph Banks, 1743–1820. Great Britain.
Bart. Benjamin Smith Barton, 1766–1815. Pennsylvania. U.S.A.
Bartl. Friedrich Gottlieb Bartling, 1798–1875. Germany.
Batal. Alexander Batalin, 1847–1898. Russia.
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Beauv. Ambroise Marie François Joseph Palisot de Beauvois, 1755–1820. France.
Beck, G. (G. Beck). Guenther Beck von Mannagetta, 1856–1931. Austria.
Bedd. R.H. Beddome, conservator of forests, Madras. Great Britain.
Belval. H. Belval, Contributions to the flora of Kiangsu and Anhwei 1930–1933. France.
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Benn. Alfred William Bennett, 1833–1902. Great Britain.
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Bergius. Peter Jonas Bergius, 1730–1790. Sweden.
Bernh. Johann Jacob Bernhardi, 1774–1850. Germany.
Berth. Sabin Berthelot, 1794–1880, author, with Webb, of Flore des Illes Canaries.

Bieb. Friedrich August Marschall von Bieberstein, 1768–1826. Germany, later Russia.
Blake. Sidney Fay Blake, 1892– . United States Department of Agriculture. U.S.A.
Blanco. Manuel Blanco, 1780–1845. Philippines.
Blume (Bl.) Karl Ludwig Blume, 1796–1862. Writer on Javan plants. Holland.
Boeckeler. Otto Boeckeler, 1803–1899. Wrote on *Cyperaceae*. Germany.
Bojer. Wenjel Bojer, 1797–1856. Author of "Hortus Mauritianus." Austria.
Boott. Francis Boott, 1792–1863. United States and England.
Bor. N.L. Bor, contemporary. India.
Borkh. Moritz Balthasar Borkhausen, 1760–1806. Germany.
Bory. Jean Baptiste Geneviève Marcelin Bory de St. Vincent, 1778–1846. France.
Bouche. Carl David Bouche, 1809–1881. Germany.
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Br., A. (A. Br.) Alexander Braun, 1805–1877. Germany.
Br., R. (R. Br.) Robert Brown, 1773–1858. Great Britain.
Brand. August Brand, 1863–1931. Germany.
Breitenb. W. Breitenbach. Wrote on *Pinellia* 1879. Germany.
Briq. John Isaac Briquet, 1870–1931. Switzerland.
Britt. Nathaniel Lord Britton, 1859–1934. New York Botanical Garden. U.S.A.
Brongn. Adolphe Theodore Brongniart, 1801–1876. France.
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Buch.-Ham. Francis Buchanan, later Lord Hamilton, 1762–1829. Wrote on Indian plants. Great Britain.
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Buerger. Johann Buerger, 1773–1842. Austria.
Bunge (Bge.) Alexander von Bunge, 1803–1890. Physician and botanist. Russia.
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Burm. f. Nicolaus Laurens Burman, the son, 1734–1793. Holland.
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Carruth. William Carruthers, 1830–1922. Great Britain.
Cass. Alexandre Henri Gabriel Cassini, 1781–1832. France.
Cav. Antonio José Cavanilles, 1745–1804. University of Madrid. Spain.
Cham. Adalbert von Chamisso, 1781–1838. Poet and naturalist. Germany.
Champ. John George Champion, 1815–1854. Scotland.
Chase. Agnes Chase, 1869– . Specialist on grasses. United States National Herbarium.
Chen. Feng-huei Chen (Ch'en Fêng-huei), contemporary. China.
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Chiao. Chi-yuen Chiao (Chiao Chi-yuen), contemporary. China.
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Chien & Cheng. S.S. Chien and W.C. Cheng.
Ching. R.C. Ching (Ch'in Jên-ch'ang), contemporary. Wrote on Chinese ferns. China.
Choisy. Jacques Denys Choisy, 1799–1859. Switzerland.
Chr., C. (C. Chr.) Carl Christensen, 1872–1942. Denmark.
Christ. Hermann Christ, 1833–1933. Switzerland.
Chun. W.Y. Chun (Woon-young Chun, Ch'ên Huan-yung), 1894– . China.
Clarion. Jean Clarion, 1780–1856. France.
Clarke. Charles Baron Clarke, 1832–1906. Specialist on *Cyperaceae*. Great Britain.
Clayt. John Clayton, 1686–1773. Virginia. U.S.A.
Comm. Philibert Commerson, 1727–1773. France and Mauritius.
Cooke, T. (T. Cooke). T. Cooke, contemporary. India.
Copel. Edwin Bingham Copeland, 1873– . California, U.S.A.
Coss. Ernest Saint-Charles Cosson, 1819–1889. France.
Craib. William Grant Craib, 1882–1933. Great Britain.
Crép. Francois Crépin, 1830–1903. Belgium.
Croiz. Leon Camille Marius Croizat, 1894– . Venezuela.
Croiz. & Metc. L.C. Croizat and F.P. Metcalf.
Cusson. Pierre Cusson, 1727–1783. Professor in Montpellier. France.
Cyr. Domenico Cyrillo, 1739–1799. Italy.

Dalziel. J.M. Dalziel, contemporary. Botanic Gardens, Kew. England.
DC. Augustin Pyramus de Candolle, 1778–1841. Projector of the "Prodromus."
DC., A. (A. DC.) Alphonse de Candolle, the son, 1806–1893. Switzerland.
DC., C. (C. DC.) Casimir de Candolle, the grandson, 1836–1918. Switzerland.
Deane. Walter Deane, 1848–1930. Boston, Massachusetts. U.S.A.
Debx. Jean Odon Debeaux, 1826–1910. France.
Decne. Joseph Decaisne, 1809–1882. France.
Desf. Réné Louiche Desfontaines, 1750–1833. France.
Desr. Louis Auguste Joseph Desrousseaux, 1753–1838. Contributor to Lamarck's "Encyclopédie Methodique." France.
Desv. Augustin Nicaise Desvaux, 1784–1856. France.
DeVol. Charles E. DeVol, contemporary. U.S.A.
Diels. Friedrich Ludwig Emil Diels, 1874–1945. Germany.
Dietr. Friedrich Gottlieb Dietrich, 1768–1850. Germany.
Dipp. Ludwig Dippel, 1827–1914. Germany.
Dode. Louis Albert Dode, 1875– . France.
D'Ombr. Henry Honywood D'Ombrain, 1818–1905. Horticulturist. Great Britain.
Domke. W. Domke, wrote on *Thymelaeaceae* in 1932–1936. Germany.
Don, D. (D. Don). David Don, 1799–1841. Great Britain.
Don, G. (G. Don). George Don, 1898–1856. England.
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Drude. Carl Georg Oscar Drude, 1852–1933. Germany.
Duby. Jean Etienne Duby, 1798–1885. Switzerland.
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Dur. Michel Charles Durieu de Maissonneuve, 1796–1878, director of the Jardin des Plantes, Bordeaux. France.
Durazz. Antonio Durazzini, about 1772. Italy.
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Franch. Adrien R. Franchet, 1834–1900, Jardin des Plantes, Paris. France.
Franch. & Sav. Franchet and Savatier.
Fries. Elias Magnus Fries, 1794–1878. Sweden.
Fruwirth. Karl Fruwirth, 1862–1930. Horticulturist. Austria.

Gaertn. Joseph Gaertner, 1732–1791. Germany.
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Gagnep. François Gagnepain, 1866–1952. France.
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Gardner. George Gardner, 1812–1849. Ceylon.
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Gaudich. Charles Gaudichaud-Beaupré, 1789–1854. France.
Georgi. Johann Gottlieb Georgi, 1729–1802. Russia.
Gilg. Ernst Gilg, 1867–1933. Germany.
Ging. Frédéric Charles Jean Gingins de Lassaraz, born 1790. Wrote on *Violaceae*. Switzerland.
Gleditsch. Johann Gottlieb Gleditsch, 1714–1786. Botanic garden, Berlin. Germany
Gmel. Samuel Gottlich Gmelin, 1743–1774. Russia.
Gord. George Gordon, 1806–1879. Great Britain.

Graebn. Karl Otto Robert Peter Paul Graebner, 1871–1933. Germany.
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Hassk. Justus Karl Hasskarl, 1811–1894. Germany.
Hayata. Bunzo Hayata, 1874–1934. Wrote on plants of Formosa and Japan. Japan.
HBK. Friedrich Alexander von Humbolt, 1769–1859. Germany.
Aime Jacques Alexandre Bonpland, 1773–1858. France.
Carl Sigismund Kunth, 1788–1850. Germany.
Authors of a great work on plants of the New World.
Heister. Lorenz Heister, 1683–1758. Germany.
Hegelm. Friedrich Hegelmaier. Monographer of *Callitriche* (1864), and of *Lemnaceae* (1868). Germany.
Hemsl. William Botting Hemsley, 1843–1924. Botanic Gardens, Kew. England.
Herb. William Herbert, 1778–1847. Great Britain.
Herrm. Johann Herrmann, 1738–1800. France.
Heyne. Benjamin Heyne, died near Madras, 1819. Wrote scientific papers.
Hieron. George Hieronymus, 1846–1921. Germany.
Hill. John Hill, 1716–1775. Great Britain.
Hitch. Albert Spear Hitchcock, 1865–1935. Authority on *Gramineae*. U.S.A.
Hochr. Bénédict Pierre Georges Hochreutiner.
Hochst. Christian Friedrich Hochstetter, 1787–1860. Germany.
Hoffm. Georg Franz Hoffman, 1761–1826. Germany.
Honda. Masaji Honda. Contemporary. Japan.
Hook. William Jackson Hooker, 1785–1865. Botanic Gardens, Kew. England.
Hook. f. Joseph Dalton Hooker, the son, 1817–1911. England.
Hook. & Arn. (H.&A.) W. J. Hooker and Arnott.
Horkel. Johann Horkel, 1769–1846. Germany.
Hornem. Jens Wilken Hornemann, 1770–1841. Denmark.
Hornst. Claudius Fredrik Hornstedt, born 1758. Sweden.
Hort. Hortorum, literally *of the gardens*. Placed after names current among horticulturists. Many of these plants have never been sufficiently described.
Host. Nicolaus Thomas Host, 1761–1834. Botanist and physician. Austria.
House. Homer Doliver House, 1878–1949. Albany, New York. U.S.A.
Houst. William Houstoun, 1695–1733. Scotland and Jamaica.
Houtt. Martinus Houttuyn, 1720–1798. Holland.
Houzeau de Lehaie. Jean H. Houzeau de Lehaie, 1820–1888. Belgium.
Hu. (H. H. Hu) Hu Hsien-hsu, contemporary. China.
Hu, S. Y. (S. Y. Hu). Hu Shiu-ying, contemporary. China.

Hu & Tang. S. Y. Hu and T. Tang.
Hubb. C. E. Hubbard.
Hubbard. Frederic Tracy Hubbard, 1875– . Harvard University. U.S.A.
Huds. William Hudson, 1730–1793. Great Britain.
Hurusawa. Isao Hurusawa, contemporary. Japan.
Hutchins. J. Hutchinson, 1884– . Great Britain.
Hylander. N. Hylander, contemporary. Sweden.

Ito, H. (H. Ito). Hirosi Ito, 1868– . Japan.

Jack. William Jack, 1795–1822, physician. Scotland and Malaya.
Jacks. Albert Bruce Jackson, 1876– . Great Britain.
Jacq. Nicolaus Joseph Jacquin, 1727–1817. Austria.
Johnston. Ivan Murray Johnston, 1898– . Harvard University. U.S.A.
Juss. Antoine Laurent Jussieu, 1748–1836. France.
Juss., A. Adrien de Jussieu. the son, 1797–1843. France.

Karst. Gustav Karl Wilhelm Hermann Karsten, 1817–1908. Germany.
Kaulf. Georg Friedrich Kaulfuss, 1786–1830. Published on Asiatic ferns. Germany.
Keng. (Y. L. Keng) Kêng Yi-li, 1898– . China.
Ker (Ker-Gawl.) John Belleden Ker, 1765–1842, also known as John Gawler. First editor of Edward's Botanical Register. Great Britain.
King. George King, 1840–1909. Calcutta and Scotland.
Kit. Paul Kitaibel, 1757–1817. Hungary.
Kitam. S. Kitamura, contemporary. Published on *Compositae* in eastern Asia. Japan.
Klatt. Friedrich Wilhelm Klatt, 1825–1897. Hamburg, Germany.
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Kobuski. Clarence Emmeren Kobuski, 1900– . Harvard University. U.S.A.
Koch, K. (K. Koch). Karl Heinrich Emil Koch, 1809–1879. Germany.
Kochs. J. Kochs. Wrote on *Thea*, 1900. Germany.
Koehne. Emil Koehne, 1848–1918. Germany.
Koern. Friedrich Koernicke, 1828–1908. Russia.
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Koidz. Gen'ichi Koidzumi, 1883– . Japan.
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Koord. S. H. Koorders.
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Korth. Peter Wilhelm Korthals, 1808–1892; published on plants of the Far East, 1839–1842. Holland.
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Ktze. Carl Ernst Otto Kuntze, 1843–1907. Germany.
Kuhn. Maximilian Friedrich Adalbert Kuhn, 1842–1894. Germany.
Kükenth. Georg Kükenthal.
Kunth. Carl Sigismund Kunth, 1788–1850. Germany.
Kunze. Gustav Kunze, 1793–1851. Holland.
Kütz. Friedrich Traugott Kützing, born 1808. Germany.

Labill. Jacques Julien Houtton de La Billardière, 1755–1834. France.

Lam. Jean Baptiste Antoine Pierre Monnet Lamarck, 1744–1829. France.
Lamb. Aylmer Bourke Lambert, 1761–1842. Great Britain.
Langsd. Georg Heinrich von Langsdorff, 1774–1852. Germany.
Lawson. Lawson & Son: Peter, died 1820; Charles, 1794–1873. Great Britain.
Laxm. Erich Laxmann, 1737–1796. Russia.
Lecomte. Henri Lecomte, editor of "Flore générale de l'Indo-Chine." France.
Ledeb. Carl Friedrich von Ledebour, 1785–1851. Russia.
Lee. (S. C. Lee) Lee Shun-ching, contemporary. China.
Lem. Charles Lemaire, 1800–1871. Belgium.
Lemoine. Victor Lemoine, 1823–1911; Emile Lemoine, 1862– . Nurserymen. France.
Lepech. S. N. Lepechin, 1737–1802. Russia.
Leschen. Louis Theodore Leschenault de la Tour, 1773–1826. India and France.
Less. Christian Friedrich Lessing, 1810–1862. Germany.
Lévl. Auguste Abel Hector Léveillé, 1863–1918. France.
Lévl. & Vant. Léveillé and Vaniot.
L'Hérit. Charles Louis L'Héritier de Brutelle, 1764–1800. France.
Libosch. Joseph L. Liboschitz, 1783–1824. Germany and Austria.
Lindl. John Lindley, 1799–1865. England.
Lingelsh. Alexander Lingelsheim, 1874–1937. Germany.
Link. Johann Heinrich Friedrich Link, 1767–1851. Germany.
Linn. (L.) Carl von Linné (Linnaeus), 1707–1778. Sweden.
Linn. f. (L.f.) Carl von Linné, the son, 1741–1783. Sweden.
Litvinov. Dmitri Ivanovitch Litvinov, 1854–1929. Russia.
Lodd. Conrad Loddiges, 1732–1826, and George, his son, 1784–1846. Nurserymen; conducted Loddiges' Botanical Cabinet from 1817–1834.
Loes. Ludwig Eduard Theodor Loesener, 1865– . Germany.
Loes. f. Otto Loesener, the son, contemporary. Germany.
Loisel. Jean Louis Auguste Loiseleur-Deslongchamps, 1774–1849. France.
Loud. John Claudius Loudon, 1783–1843. Great Britain.
Lour. Juan Loureiro, 1715–1796. Author of "Flora Cochinchinensis." Portugal.
Ludwig. Christian Gottlieb Ludwig, 1700–1773. Germany.
Lutati. Vignolo-Lutati, wrote on grasses, 1904. Italy.

Maack. Richard Maack, 1825–1886. Russia.
Mak. Tomitaro Makino, 1863– . Japan.
Mansf. Rudolph Mansfield, 1901– . Germany.
Marsh. Humphrey Marshall, 1722–1801. U.S.A.
Marsili. Giovanni Marsili, 1727–1795. Italy.
Mart. Karl Friedrich Philipp von Martius, 1794–1868. Professor at Munich, founder of the "Flora Brasiliensis." Germany.
Matsuda. Sadahisa Matsuda. Wrote many articles on the botany of Japan and China, 1894–1920. Japan.
Matsum. Jinzo Matsumura, 1855–1928. Japan.
Maxim. Carl Johann Maximowicz, 1827–1891. Russia.
Maxon. William Ralph Maxon, 1877–1948. Specialist on ferns. United States National Herbarium.
McClure. F.A. McClure, 1897– . China and U.S.A.
Medic. Friedrich Casimir Medicus, 1736–1808. Germany.

Meisn. Carl Friedrich Meisner (or Meissner), 1800–1874. Switzerland.
Merr. Elmer Drew Merrill, 1876–1956. Harvard University. Philippines and U.S.A.
Metcalf. Franklin P. Metcalf. Published on flora of China, 1925–1942. China and U.S.A.
Mett. Georg Heinrich Mettenius, 1823–1866. Professor at Leipzig. Holland.
Mey. Carl Anton Meyer, 1795–1855. Russia.
Meyen. Franz Julius Ferdinand Meyen, 1804–1840. Germany.
Mez. Karl Christian Mez, 1864–1944. Monographer of the bromeliads. Germany.
Michx. Andre Michaux, 1746–1802. France and North America.
Miers. John Miers, 1789–1879. Great Britain.
Mill. Philip Miller, 1691–1771. England.
Miq. Friedrich Anton Wilhelm Miquel, 1811–1871. Professor of Botany at Utrecht; author of "Annales Musei botanici Lugduno-Batavi." Holland.
Mirbel. Charles François Brisseau de Mirbel, 1776–1854. France.
Mitf. Algernon Bertram Freeman-Mitford, Lord Redesdale, 1837–1916, author of "The Bamboo Garden." Great Britain.
Moench. Konrad Moench, 1744–1805. Germany.
Moore. Thomas Moore, 1821–1887. Author of "Index Filicum." England.
Moore, S. (S. Moore). Spencer Le Marchant Moore, 1851–1931. England.
Moritzi. Alexander Moritzi, 1806–1850. Switzerland.
Morr. Charles Jacques Edouard Morren, 1833–1886. Belgium.
Moulins, Ch. des (Ch. des Moulins). Charles des Moulins, 1797–1875. France.
Muell. Jean Mueller of Aargau, 1828–1896. Switzerland. (=Muell.-Arg.)
Muenchh. Otto von Muenchhausen, 1716–1774. Germany.
Muhl. Henry Ludwig Muhlenberg, 1756–1817. Pennsylvania. U.S.A.
Munro. William Munro, 1816–1880. Great Britain.
Murr. Johann Andreas Murray, 1740–1791. Germany.
Nakai. Takenoshi Nakai, 1882–1952. Japan.
Nash. George Valentine Nash, 1864–1919. New York. U.S.A.
Neck. Noel Joseph de Necker, 1729–1793. France.
Nees. Christian Gottfried Nees von Esenbeck, 1776–1858. Germany.
Nels. John Gudgeon Nelson (Senilis), 1818–1882. Great Britain.
Nels. A. Aven Nelson, 1859–1952. University of Wyoming. U.S.A.
Nels., E. Elias Emanuel Nelson, 1876–. U.S.A.
Nutt. Thomas Nuttall, 1786–1859. U.S.A.

Ohwi. Jisaburo Ohwi, 1905–. Tokyo Science Museum. Japan.
Oliv. Daniel Oliver, 1830–1917. Botanic Gardens, Kew. England.
Osbeck. Pehr Osbeck, 1723–1805. Sweden.
Otto. Friedrich Otto, 1782–1856. Germany.

Palibin. Ivan Vladimirovitch Palibin, 1872–. Russia.
Pall. Peter Simon Pallas, 1741–1811. Professor and explorer in Russia.
Palmer. Ernest Jesse Palmer, 1875–. U.S.A.
Pampan. Renato Pampanini, 1875–. Italy.
Parl. Filippo Parlatore, 1816–1877. Italy.
Pasq. Giuseppe Antonio Pasquale, 1820–1893. Italy.
Pav. José Antonio Pavon, died 1844. Spain.
Pax. Ferdinand Pax, 1858–1942. Germany.

Paxt. Joseph Paxton, 1802–1865. England.
P'ei (Chien P'ei). P'ei Chien, contemporary. China.
Pennell. Francis Whittier Pennell, 1886–1952. Academy of Sciences, Philadelphia. U.S.A.
Perk. Janet Russel Perkins, 1853–1933. U.S.A.
Pers. Christian Hendrik Persoon, 1755–1837. Germany.
Peterm. Wilhelm Ludwig Petermann, 1806–1855. Germany.
Pilger. Robert Knud Friedrich Pilger, 1876–1953. Germany.
Planch. Jules Emile Planchon, 1833–1900. Professor of Botany at Montpellier. France.
Poir. Jean Louis Marie Poiret, 1755–1834. France.
Porterfield. Willard Merrit Porterfield, Jr., 1893–. U.S.A.
Praeger. Lloyd Praeger, 1865– . Dublin, Ireland.
Prain. David Prain, 1857–1944. Great Britain.
Prain & Burk. Prain & Burkill.
Prantl. K. A. E. Prantl, 1849–1893. Germany.
Presl. Karel Boriwog Presl, 1794–1852. Czechoslovakia.
Pritz. Ernst Pritzel, 1875–. Germany.
Proch., J. (J. Proch.). J. I. Prokhanov (Prochanov), contemporary. Russia.
Pursh. Frederick Traugott Pursh, 1774–1820. Germany and U.S.A.

Raddi. Giuseppe Raddi, 1770–1829. Italy.
Raf. Constantino Samuel Rafinesque-Schmaltz, 1784–1842. U.S.A.
Ram. Louis Francois Elisabeth Ramond de Carbonnières, 1753–1827. France.
Regel. Eduard von Regel, 1815–1892. Founder of "Gartenflora." Germany and Russia.
Regel & Maack. Eduard von Regel and Richard Maack.
Rehd. Alfred Rehder, 1863–1949. Harvard University. U.S.A.
Rehd. & Wilson. Alfred Rehder and Ernest Henry Wilson.
Reichb. Heinrich Gottlieg Ludwig Reichenbach, 1793–1879. Germany.
Reichb. f. Heinrich Gustav Reichenbach, the son, 1823–1889. Authority on orchids. Germany.
Reinw. Kaspar Georg Karl Reinwardt, 1773–1854. Professor of botany at Leyden. Holland.
Rendle. Alfred Barton Rendle, 1865–1938. Great Britain.
Retz. Andres Johan Retzius, 1742–1821. Sweden.
Rich. Louis Claude Marie Richard, 1754–1821. France.
Rich., A. (A. Rich.). Achille Richard, 1794–1852. France.
Ricker. Percy Leroy Ricker, 1878–. United States Department of Agriculture.
Ridley. Henry N. Ridley. Author of "Flora of the Malay Peninsula," 1922–1925. Great Britain.
Riv. Marie Auguste Rivière, 1821–1877; Charles Marie Rivière, 1845– . Nursery men. France.
Robins. Benjamin Lincoln Robinson, 1864–1935. Harvard University. U.S.A.
Roem. Johann Jacob Roemer, 1763–1819. Switzerland.
Roem. & Schult. (R. & S. Roemer and Schultes.
Rolfe. Robert Allen Rolfe, 1855–1921. Great Britain.
Roman. Frederic Romanet du Caillaud. France.
Roscoe. William Roscoe, 1753–1831. England.
Rosen. J. P. Rosen, at Upsala in 1821. Sweden.
Roth. Albrecht Wilhelm Roth, 1757–1834. Germany.
Rottb. Christen Fries Rottboell, 1727–1797. Denmark.

Roxb. William Roxburgh, 1759–1815. Botanic Gardens, Calcutta. India and Great Britain.
Royle. John Forbes Royle, 1799–1858. Great Britain.
Rupr. Franz Josef Ruprecht, 1814–1870. Czechoslovakia and Russia.
Ruiz. Hipolito Ruiz Lopez, 1764–1815. Author with Pavon of a flora of Peru and Chili. Spain.

Salisb. Richard Anthony Salisbury, 1761–1829. England.
Sam. Gunnar Samuelsson, contemporary. Sweden.
Sarg. Charles Sprague Sargent, 1841–1927. First director of the Arnold Arboretum, Harvard University. U.S.A.
Sav. Ludovic Savatier, 1830–1891. France.
Savi. Gaetano Savi, 1769–1844. Italy.
Schauer. Johan Konrad Schauer, 1813–1848. Germany.
Scheele. Ernst Scheele, 1893–1929. Germany.
Schindl. Anton Karl Schindler, 1879–. Germany.
Schlecht. Diedrich Franz Leonhard von Schlechtendahl, 1794–1866. Germany.
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Schlittler. J. Schlittler, contemporary. Switzerland.
Schltr. Rudolf Schlechter, 1872–1925. Germany.
Schk. Christian Schkuhr, 1741–1811. Germany.
Schmidel. Casimir Christoph Schmidel, 1718–1792. Germany.
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Schnarf. Karl Schnarf.
Schneid. Camillo Schneider, 1876–1951. Germany.
Schnizl. A. Schnizlein, 1814–1868. Germany.
Schott. Heinrich Wilhelm Schott, 1794–1865. Austria.
Schrad. Heinrich Adolph Schrader, 1767–1836. Germany.
Schrank. Franz von Paula von Schrank, 1747–1835· Germany.
Schreb. Johann Christian Daniel von Schreber, 1739–1810. Germany.
Scribn. Frank Lamson-Scribner, 1851–1938. United States Department of Agriculture.
Schult. Joseph August Schultes, 1773–1831. Germany.
Schultz-Bip. Karl Heinrich Schultz, (Bipontinus, i.e. of Zweibrücken), 1805–1867. Germany.
Schum. Karl Moritz Schumann, 1851–1904. Germany.
Schweig. August Friedrich Schweigger, 1783–1821. Germany.
Schweig. & Körte. Schweigger and Körte.
Schweinfurth. Charles Schweinfurth, 1890–. Harvard University. U.S.A.
Scop. Giovanni Antoni Scopoli, 1723–1788. Italy.
Seem. Berthold Carl Seemann, 1825–1871. Germany.
Sello. Friedrich Sello, (later spelled Sellow), 1789–1831, German traveller in South America.
Ser. Nicolas Charles Seringe, 1776–1858. France.
Shibata. Keita Shibata, 1877–. Japan.
Sibth. John Sibthorp, 1758–1796. Great Britain.
Sieb. Philipp Frans von Siebold, 1796–1866. Holland.
Sieb. & Zucc. (S. & Z.). Siebold and Zuccarini.
Simonkai. Lajos tól Simonkai (né Simkovics), 1851–1910. Hungary.
Sims. John Sims, 1792–1838. For many years editor of Curtis' Botanical Magazine.

England.
Sincl. George Sinclair, 1786–1834. Great Britain.
Sleumer. Hermann Sleumer, contemporary. Germany.
Smith (Sm.). James Edward Smith, 1759–1828. First president of the Linnean Society. England.
Sm., A. C. (A. C. Sm.). Albert Charles Smith, 1906–. U.S.A.
Sm., J. (J. Sm.). John Smith, 1798–1888. Great Britain.
Sm., W. W. (W. W. Sm.). William Wright Smith, 1875–. Botanic Garden, Edinburgh, Scotland.
Sobol. Gregor Sobolewski. Published botanical papers about 1799. Russia.
Solms. Herman Graf zu Solms Laubach, 1842–1915. Germany.
Spach. Edouard Spach, 1801–1879. France.
Spreng. Kurt Sprengel, 1766–1833. Germany.
Spring. Anton Fr. Spring, 1814–1872. Belgium.
Standl. Paul Carpenter Standley, 1884–. Chicago Natural History Museum. U.S.A.
Stapf. Otto Stapf, 1857–1933. Botanic Gardens, Kew. England.
Staunt. George Leonard Staunton. Expedition to China, 1792. Great Britain.
Stearn. W. T. Stearn, 1911–. Horticultural Society, London. England.
Stebbins. George Ledyard Stebbins, Jr., 1906–. University of California. U.S.A.
Steud. Ernst Gottlieb Steudel, 1783–1856. Germany.
Steven. (Stev.). Christian von Steven, 1781–1863. Russia.
Steward. Albert Newton Steward, 1897–. China and U.S.A.
Stokes. Jonathan Stokes, 1755–1831. Great Britain.
Sun (Y. Z. Sun). Sun Hsiung-ts'ai, contemporary. Wrote on Chinese *Labiatae*. China.
Sw. Olof Swartz, 1760–1818. Sweden.
Sweet. Robert Sweet, 1783–1835. Horticulturist and botanist. Great Britain.
Swingle. Walter Tennyson Swingle, 1871–1952. United States Department of Agriculture.
Szysz. Ignaz Szyszylowicz, 1857–1910. Poland.

Tagawa. M. Tagawa, contemporary. Japan.
Takeda. Hisayoshi Takeda, 1883–. Japan.
Tanaka. Yoshio (or Ushio) Tanaka, 1838–1916. Japan.
Tang. (T. Tang). Chin T'ang, contemporary. China.
Tenore. Michele Lenore, 1780–1861. Italy.
Thell. Albert Thellung, 1881–1928. Switzerland.
Thoms. Thomas Thomson, 1817–1878. Great Britain and India.
Thouin. André Thouin, 1747–1824. France.
Thunb. Carl Peter Thunberg, 1743–1822. Sweden.
Thwaites. George Henry Kendrik Thwaites, 1811–1882. Ceylon.
Tobler. Friedrich Tobler, 1879–. Wrote on the genus *Hedera*. Germany.
Todaro. Agostino Todaro, 1818–1892. Italy.
Torr. John Torrey, 1796–1873. New York. U.S.A.
Tourn. Joseph Pitton Tournefort, 1656–1708. France.
Tracy. Samuel Mills Tracy, 1847–1920. United States Department of Agriculture.
Tratt. Leopold Trattinick, 1764–1849. Austria.
Trautv. Ernst Rudolph von Trautvetter, 1809–1889. Russia.
Tréc. Auguste Trécul. Wrote on the family "Artocarpees" 1847. France.
Trev. Conte Victore Trevisan, 1818–1897. Italy.
Trevir. Christian Ludolf Treviranus, 1779–1864. Germany.

Trin. Carl Bernhard Trinius, 1778–1844. Russia.
Trin. & Rupr. Trinius and Ruprecht.
Turcz. Nikolai Stepanovich Turcaninow, 1796–1864. Russia.
Trew. Christoph Jacob Trew, 1695–1769. Germany.
Tsiang (Y. Tsiang). Tsiang Ying, contemporary. China.
Tuckerm. Edward Tuckerman, 1817–1886. U.S.A.
Tutch. W. J. Tutcher, contemporary. Great Britain.

Ulbrich. Eberhard Ulbrich, 1879–. Berlin. Germany.
Underw. Lucien M. Underwood, 1853–1907. Specialist on ferns. U.S.A.

Vahl. Martin Vahl, 1749–1804. Denmark.
Vaniot. Eugene Vaniot. Published on Chinese plants, 1902–1909. France.
v.d.B. Roelof Bengamin van den Bosch, 1810–1862. Wrote on *Hymenophyllaceae.* Holland.
Veitch. John Gould Veitch, 1838–1870, and successors. Horticulturists. England.
Vent. Etienne Pierre Ventenat, 1757–1808. France.
Vig. René Viguier, 1880–1931. France.
Vill., F. (F. Vill.). Celestine Fernandez-Villar, 1838–1907. Spain and the Philippines.
Vilm. Pierre Philippe André Levéque de Vilmorin, 1746–1804; Pierre Vilmorin, 1816–1860; Henry L. de Vilmorin, died 1899; Maurice Levéque de Vilmorin, 1849–1919; Philippe de Vilmorin 1872–1917. Seedsmen and horticulturists, Paris. France.
Vis. Roberto de Visiani, 1800–1878. Italy.
Voss. Andreas Voss, 1857–1924. Germany.

Wahlenb. Georg Wahlenberg, 1780–1851. Sweden.
Waldst. Franz de Paul Adam, Graf von Waldstein, 1759–1823. Austria.
Wall. Nathaniel Wallich, 1786–1854. Wrote on plants of India and the Far East. Denmark.
Wallr. Carl Friedrich Wilhelm Wallroth, 1792–1857. Germany.
Walp. Wilhelm Gerhard Walpers, 1816–1853. Germany.
Walt. Thomas Walter, 1740?–1789. South Carolina. U.S.A.
Wangerin. Walter Wangerin, 1884–1938. Germany.
Warb. Otto Warburg, 1859–1938, Germany.
Warder. John Aston Warder, 1812–1883. physician and horticulturist. Cincinnati. U.S.A.
Wats. W. (W. Wats.). William Watson, 1858–1925, horticulturist. Botanic Gardens, Kew. England.
Webb. Philip Barker Webb, 1793–1854. Great Britain.
Weigel. Christian Ehrenfried Weigel, 1784–1831. Germany.
Wendl. Hermann Wendland, 1823–1903. Germany.
Wettst. Richard von Wettstein, 1862–1931. Austria.
Wight. Robert Wight, 1796–1872. Writer on Indian plants. Great Britain.
Willd. Karl Ludwig Willdenow, 1765–1812. Germany.
Wils. Ernest Henry Wilson, 1876–1930. Harvard University. U.S.A.
Wimm. Christian Friedrich Heinrich Wimmer, 1803–1868. Germany.
With. William Withering, 1741–1799. Great Britain.
Witte. Heinrich Witte, 1825–1917. Horticulturist. Holland.

Wolff. Hermann Wolff. Wrote on Asiatic *Umbelliferae*, 1919–1933. Germany.
Woynar. Heinrich Woynar, 1865–1917. Austria.
Wright, C.H. (C.H. Wright). Charles Henry Wright, 1864– . England.

Yabe. Yoshitada Yabe. Wrote on botany of eastern Asia, 1900–1927. Japan.
Young. Maurice Young. Nurseryman, about 1872. Great Britain.

Zenker. Jonathan Carl Zenker, 1799–1837. Germany.
Zoll. Heinrich Zollinger, 1818?–1859. Switzerland and Java.
Zucc. Joseph Gerhard Zuccarini, 1797–1848. Germany.

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AMBL-B	Annales Musei Botanici Lugduno-Batavi (1863–1869).
Am.JB.	American Journal of Botany. Baltimore, Maryland.
Am.N.	American Naturalist. Philadelphia.
Ark.Bot.	Arkiv för Botanik. Stockholm.
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L.S.J.	Lingnan Science Journal, Canton.
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M.F.	Merrill, Flora of Manila (1912).
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NACLC	Nova Acta Academe Caesareae Leopoldino-Carolinae naturae curiosorum. Breslau.
Nak.L.	Nakai, Lespedeza of Japan and Korea (1927).
NAMP	Nouvelles Archives du Muséum d'historie Naturelle, Paris. Ser. II.
O.B.Z.	Oesterreichische botanische zeitschrift. Vienna.
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Pl.W.	Sargent, Plantae Wilsonianae (1911–1917).
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Sarg.	Sargentia. Harvard University
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St.P.M.	Mémoires de l'Academie Imperiale des Sciences de St. Pétersbourg.
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Suny.	Sunyatsenia. Canton.
To.J.Sc.Bo.	Imperial University of Tokyo, Faculty of Science. Journal, Section III. Botany.
Tor.B.	Bulletin of the Torrey Botanical Club
Verh.Bot.Ver.	Brandenburg-Verhandlungen des botanischen Vereins der Provinz Brandenburg. Berlin.
Wa.A.	Walpers, Annales botanices systematicae (1848–1868).
Wash.J.	Journal of the Washington academy of sciences. Washington, D.C.
Watt	Watt, The Wild and Cultivated Cotton Plants of the World (1907).
Wils.L.	Wilson, The Lilies of Eastern Asia (1925).
W. & R.Az.	Wilson & Rehder, A Monograph of Azaleas (1921).
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Abaxial 遠軸的 The side or face away from the axis.
Abortive 敗育的 Imperfectly developed.
Acaulescent, acaulose 無莖的 Seeming to be stemless.
Accrescent 老膨的 Becoming larger and more fleshy with age.
Achene 瘦果 A small hard dry one-seeded fruit in which the ovary wall closely surrounds the seed but is clearly separate from it.
Acicular 針狀的 Awl-shaped or needle-like.
Acorn 橡果 The nut of an oak.
Acuminate 漸尖的 Tapering to a slender point.
Acute 急尖的 Sharply pointed, but not drawn out to a slender point.
Adaxial 近軸的 The side or face next to the axis.
Adnate 貼生的 Growing fast to a different kind of organ or part.
Adpressed 緊貼的 Appressed.
Adventitious 不定的 Produced abnormally, or in an unusual location.
Aggregate 密聚的 Gathered together, as several carpels produced by one flower.
Alternate 互生的 In more than one rank but not opposite or in pairs.
Alveolate 蜂窠狀 Marked as a honey comb.
Ament 柔荑花序 A catkin; a spike of unisexual apetalous flowers, usually with bracts and often deciduous.
Amplexicaul 抱莖的 Clasping the stem.
Anadromous 上行的 In venation of fern leaves, with the first set of each segment on the upper side of the midrib; the opposite of catadromous.
Anastomosing 網結的 Connecting to form a network.
Andro- 雄蕊的 The male sex.
Androgynophore 雌雄蕊柄 A stalk supporting both stamens and carpels within the flower.
Annual 一年生的 Referring to plants which complete their cycle of growth in one season.
Annulate 環狀的 Having or arranged in rings.
Annulus 環帶 The ring of elastic cells extending from the stalk and enclosing the sporangium of ferns, and which bursts the sporangium at maturity.
Anterior 前部的 Turned away from the axis; the opposite of posterior.
Anther 花葯 The part of a stamen which contains the pollen sacs.
Anther cell 葯室 A cavity in the anther where pollen grains are borne.
Anthesis 花期 The time when a flower expands and when fertilization takes place.
Apetalous 無被 Without petals.
Apical 頂端的 At the point or tip of an organ.
Apiculate 具細尖的 With a short sharp but not stiff point at the tip.
Apocarpous 離心皮的 With separate carpels.
Appressed 緊貼的 Lying flat.
Aquatic 水生的 Growing in the water.
Araneous 附属的 Arachnoid, like a cobweb; covered with an entanglement of whitish hairs.
Arborescent 喬木狀的 Like a tree.
Arcuate 弧曲的 Curved.
Areole (pl. *areolae*) 網隙 A small open space or cavity.
Aril 假種皮 A fleshy outgrowth from the base of a seed, often brightly colored and

usually surrounding the seed.

Arillate 具假種皮的 Having an aril.

Aristate 具芒的 Awned; bearing a bristle-like appendage.

Armed 具刺的 Bearing thorns or prickles.

Aromatic 芳香的 Having a spicy smell or taste.

Asexual 無性的 Without sex organs.

Asymmetrical 不對称的 Irregular in outline or shape.

Athyroid 花葯着生式 Resembling *Athyrium*.

Attenuate 漸狭的 Tapered.

Auricle 葉耳 A small lobe or ear, e.g. at the base of a leaf blade.

Awl-shaped 錐状的 Narrow and tapering to a point; subulate.

Awn 芒 A bristle-like appendage, especially on the glumes or lemmas of grasses.

Axil 腋 The angle formed between the axis and any organ which arises from it, particularly a leaf.

Axile 中軸的 Borne on the axis.

Axile placenta 中軸胎座 Where the ovules are arranged along the central axis of the ovary.

Axillary 腋生的 Growing in an axil.

Axillary bud 腋芽 A bud located in a leaf axil.

Axis 軸 An imaginary line around which the organs, e.g. of an inflorescence, are developed.

Bacca 漿果 Berry.

Baccate 漿果状的 Berry-like.

Barbate 具髯毛的 Bearded.

Bark 樹皮 The covering of a stem outside the wood, the bast.

Basal leaf 基生葉 A leaf attached to the base of the stem.

Basifixed 底着的 Attached by the base.

Bast 靭皮部 The bark of the stem.

Beak 喙 A pointed projection.

Bearded 具髯毛的 Furnished with long stiff hairs.

Berry 漿果 A fleshy fruit in which the seeds are enclosed by a pulpy ovary wall.

Biennial 二年生的 Requiring two seasons to complete its life cycle.

Bifid 二裂的 2-cleft.

Bifurcate 二叉的 Twice forked.

Bilabiate 二脣的 2-lipped.

Bilateral 左右的 Arranged on opposite sides of an axis.

Binate 二裂的 Divided into two parts.

Bipinnate 二回羽状的 When both primary and secondary divisions of a leaf are pinnate.

Bisexual 両性的 Having both stamens and pistils.

Biternate 二回三出的 Twice divided into threes.

Bladdery 膀胱状的 Thin and inflated.

Blade 葉片 The expanded part of a leaf.

Bloomy 蠟粉 With a whitish waxy covering.

Bract 苞片 A modified leaf, especially the leaf from the axil of which a flower develops.

Bracteal 苞状的 Having the nature of a bract.

Bracteate 具苞的 Bearing bracts.

Bracteole 小苞片 A small bract.

Bractlet 小苞片 A bract inserted on a pedicel rather than subtending it.

Branchlet 小枝 A small branch.

Bristle 剛毛 A stiff hair.
Bristly 具剛毛的 Having bristles.
Bud scale 芽鱗 One of the scales covering a bud.
Bud scale scar 芽鱗痕 The mark left where a bud scale was detached.
Bulb 鱗莖 A leaf bud with fleshy scales, usually developing underground.
Bulbiferous 具鱗莖的 Bulb-bearing.
Bulbil 珠芽 A small bulb.
Bulblets 小鱗莖 Small bulbs.
Bullate 具泡状隆起的 Blistered, swollen, inflated.
Bur 芒殼 A densely prickly fruit.
Bursicle 小袋形 A small pouch.
Bush 叢生灌木 A low densely branching shrub.
Caducous 早落的 Dropping off early.
Caespitose 叢生的 Growing in tufts.
Calcareous 石灰質的 Of or preferring limestone.
Callus 穎托 An enlarged extension of the lemma below its point of insertion (in a grass spikelet).
Calyx, (pl. *calyces*) 花萼 The outer floral envelope.
Calyx lobes 萼裂片 Divisions of the calyx.
Calyx tube 萼筒 The tubular structure formed by union of the sepals.
Campanulate 鐘状的 Bell-shaped.
Canal 溝 An internal channel.
Canaliculate 具溝的 Channelled.
Canescent 被灰白毛的 Densely covered with grey hairs; hoary.
Capillary 毛細的 Slender, hair-like.
Capitate 頭状的 Growing in heads.
Capsular 蒴果状的 Having capsules.
Capsule 蒴果 A dry dehiscent fruit.
Carinal 龍骨状的 Relating to the keel.
Carnivorous 食虫的 Flesh-eating, applied to plants which digest insects or other small animals.
Carpel 心皮, 果瓣 A simple pistil, representing a single female sporophyll.
Carpellate 心皮的 Having carpels.
Carpophore 果瓣柄 A stalk which supports the carpels within the flower.
Cartilaginous 脆骨質 Hard and tough, leathery.
Caruncle 種阜 A wart or protuberance near the hilum of a seed.
Caryopsis 穎果 A superior one-seeded fruit in which the ovary wall is united to the seed-coat; the grain of a grass.
Castaneous 棕色 Chestnut-colored.
Catadromous 下行的 In venation of fern leaves, with the first set of nerves of each segment on the lower side of the midrib; opposite of anadromous.
Catkin 柔荑花序 A deciduous spike of unisexual apetalous flowers; an ament.
Caudate 尾状的 Having a slender, tail-like appendage.
Caudex 莖基 The persistent base of an herbaceous perennial; an upright rootstock.
Caulescent 具莖的 Apparently having a stalk or stem.
Cauline 莖生的 Arising from the stem.
Cell 子室 The cavity of an ovary containing ovules or seeds.
Centimeter (cm.) 厘米 One hundredth of a meter.
Chaffy 膜片状 Having papery scales.

Chartaceous 堅紙質的 Papery, parchment-like.
Choripetalous 離瓣的 Having separate petals; polypetalous.
Ciliate 具緣毛的 Fringed with hairs.
Ciliolate 具短緣毛的 Fringed with very fine hairs.
Circinate 拳捲的 Coiled.
Circumscissile 周裂的 Dehiscing as if cut around in a circle.
Cladode 葉状枝 A branch which appears like a leaf.
Cladophyll 葉状枝 A cladode.
Clathrate 方格状 Latticed; pierced with openings.
Clavate, claviform 棍棒状的 Club-shaped.
Claw 瓣爪 The narrowed base of a petal.
Cleft 半裂的 Deeply cut.
Cleistogamous 閉花受精的 Having close fertilization within unopened flowers.
Climbing 攀援的 Rising by clinging to other objects.
Clone 無性繁殖的 Members which have descended from one plant by vegetative reproduction.
Club-shaped 棍棒状 Gradually thickened upward from a slender base.
Coccus (pl. *cocci*) 分果瓣 Section of a schizocarp or lobed fruit.
Cohering 連着的 Joining together of the parts of a single whorl.
Collateral 並生 Standing side by side, as when strands of xylem and phloem appear side by side in a stem, usually in the same radius.
Columella 軸柱 The persistent central axis around which the carpels of some fruits are arranged, e.g. *Geranium*.
Columnar 柱状的 Having the form of a column.
Commisure 接着面 The face by which two carpels adhere.
Comose 具叢毛的 Bearing a tuft of hairs at one end.
Complete flower 完全花 A flower with calyx, corolla, stamens and pistil.
Compound 複的 Made up of similar parts.
Compressed 扁的 Flattened.
Concave 凹的 Hollow, as the inside of a saucer.
Concentric 同心 Having a common center.
Concolorous 同色的 Of one color.
Condublicate 對摺的 Folded lengthwise.
Cone 球果 A fruit like that of the pine, with scales; a strobilus.
Confluent 会合的 Blended into one.
Conical 圓錐状的 Cone-shaped.
Connate 合生的 United.
Connective 葯隔 The portion of an anther connecting its two cells.
Connivent 靠合的 Coming into contact.
Constricted 縊縮的 Drawn together.
Contiguous 鄰接的 When neighboring parts are in contact.
Contorted 旋轉的 Twisted.
Convex 凸的 Having a rounded surface.
Convolute 蔕捲的 (莖), 旋轉的 (花) When one part is wholly rolled up in another; when the margins of a leaf are rolled inward above.
Cordate 心形的 Heart-shaped.
Coriaceous 革質的 Leathery.
Cork 木栓 Protective tissue of older plant parts, impervious to liquids.
Corm 球莖 A solid bulb-like stem, often covered with sheath-like bracts.

Cormose 球茎状 Corm-like.
Corolla 花冠 The inner perianth, composed of petals, free or united.
Corolla limb 冠簷 The expanded part of a gamopetalous corolla.
Corolla lobes 冠瓣 Divisions of the corolla.
Corolla tube 冠筒 The tubular structure formed by union of the petals.
Corolline 花冠状 Corolla-like.
Corona 副冠 A crown; sometimes a ring-like appendage on the corolla (or perianth).
Corrugate 皺褶的 Wrinkled.
Cortex 皮層 The outer bark of the stem or root.
Corymb 繖房花序 A flat-topped flower cluster in which the outer flowers open first.
Corymbose 繖房状 Corymb-like.
Cosmopolitan 遍生 Distributed throughout the world.
Costa (pl. *costae*) 中肋 A rib.
Cotyledons 子葉 The first leaves of the embryo.
Creeping 匍匐的 Growing flat on the ground, and rooting at intervals.
Crena (pl. *crenae*) 圓齒 A rounded tooth or notch.
Crenate 圓齒状 Scalloped.
Crenulate 細圓齒状 Crenate with small scallops.
Crested 雞冠状 With an elevated line or ridge on the surface.
Crisped 皺波状的 Curled.
Cristate 雞冠状 Crested.
Crown 冠 Corona.
Crustaceous 堅脆的 Of brittle texture.
Cryptogams 隱花植物 Plants which reproduce by spores rather than by seeds.
Culm 桿 The hollow jointed stem of a grass.
Cultigen 栽培品 A domesticated plant species of obscure origin.
Cuneate 楔形的 Wedge-shaped.
Cupular 有殼斗的 Having a little cup.
Cupule 殼斗 A little cup, like the cup of an acorn of the oak.
Cusp 硬尖 A sharp rigid point.
Cuspidate 具硬尖的 With a cusp.
Cyathiform 盃状的 In the form of a *Cyathium*.
Cyathium 盃状聚繖花序 The inflorescence of *Euphorbia*, consisting of bracts with glands and single stamens which represent staminate flowers surrounding the 3-celled ovary which is the pistillate flower.
Cymbiform 舟状 Boat-shaped.
Cyme 聚繖花序 A flower cluster, sometimes flat-topped, in which the central flowers open first.
Cymose 聚繖状的 Relating to cymes.
Cypsela 連萼瘦果 An achene surrounded by an adnate calyx, as in the fruit of *Compositae*.
Cystoliths 鐘乳体 Mineral concretions, usually of calcium carbonate, such as occur in the cells of some *Urticaceae*.
Cytogenetic 細胞遺傳的 Relating to the formation and development of cells, especially with reference to chromosomes and gene systems.
Deciduous 凋落的 Falling at maturity; having leaves which fall at maturity; not evergreen.
Deciduous tree 落葉樹 Tree with leaves falling in the autumn.
Decompound 多回分裂 Several times compound.

Decumbent 外傾的 Reclining at the base.
Decurrent 下延的 Running down, as when some leaf bases extend down the stem from their point of attachment.
Decussate 交互対生的 Arranged in pairs alternately at right angles to those above and below.
Definite inflorescences 有限花序 Where the axis ends in a flower.
Deflexed 外折的 Bent outward.
Dehiscent, dehiscing 開裂 Splitting open at maturity.
Deliquescent 歧散的 Dividing repeatedly so that the main stem is lost in the branches.
Deltoid 三角形 Of triangular shape.
Dentate 牙歯状 With teeth directed forward.
Denticulate 細牙歯状 Finely toothed.
Depressed 凹陥的 Sunk down, flattened from above.
Determinate inflorescences 有限花序 Those which end in a bud.
Diadelphous 二体雄蕊 Describing stamens united by their filaments into two sets.
Dichotomous 二歧的 Forked by pairs.
Didynamous 二強雄蕊 Describing flowers with 4 or 6 stamens, one pair shorter than the others.
Digitate 掌状的 Fingered; describing a compound leaf in which all the leaflets are borne at the top of the petiole.
Diminutive 小型 Very small.
Dimorphic, dimorphous 二形的 Of two forms.
Dioecious 雌雄異株 Flowers unisexual, with the staminate and pistillate borne on different plants.
Diplazoid 雙苞蕨形 Resembling *Diplazium*.
Disarticulating 脱節的 Separating at joints.
Disc 花盤 A circular enlargement of the receptacle within the calyx or within the corolla and stamens; the central part of the head in *Compositae*, inside the rays.
Disc flower 心花 A flower of the disc in *Compositae*.
Disciform, discoid 盤状的 Disc-like.
Dissected 多裂的 Cut into many segments.
Distichous 二列的 Arranged in two vertical ranks.
Distinct 離生的 Separate, not united.
Divided 分裂的 Cut into divisions to the base or to the midrib.
Dormant bud 潜芽 One which is not active.
Dorsal 背部的 The surface turned away from the axis.
Dorsal suture 背縫 The line down the back of a carpel, comparable to the midrib of a leaf.
Dorsifixed 背着的 Attached on the back.
Dorsiventral 背腹分明 Having dorsal and ventral surfaces, as a leaf.
Doubly serrate 重鋸歯 With a double row of teeth.
Downy 具短茸毛 With fine soft hairs.
Drupaceous 核果状 Like a drupe.
Drupe 核果 A stone fruit in which a bony endocarp encloses the seed, e.g. the peach.
Drupelet 小核果 A little drupe.
Dryopteroid 金星草状 Resembling *Dryopteris*.
Ebracteate 無苞的 Without bracts.
Echinate 具刺的 Covered with prickles.

Echinulate 具小刺的 Covered with small prickles.
Eciliate 無繊毛的 Without cilia.
Edentate 無歯的 Without teeth.
Eglandular 無腺的 Without glands.
Elaters 弾絲 The ribbon-like appendages on the spores of *Equisetum*.
Emarginate 微缺的 Having a notch at the tip.
Embryo 胚 The young plant formed in a seed.
Endemic 特産 Confined to a particular region.
Endocarp 内果皮 The inner layer of the pericarp.
Endosperm 胚乳 The nutritive tissue surrounding the embryo in many seeds.
Ensiform 劍状的 Sword-shaped.
Entire 全縁 With even margin, not toothed.
Epappose 無冠毛 Without pappus.
Epicalyx 副萼 A whorl of bracts resembling an extra calyx.
Epigynous 上位的 Borne upon or above the ovary.
Epipetalous 冠着 Borne on the petals.
Epiphytes 附生植物 Plants which grow on other plants but draw no nourishment from the plants on which they grow.
Epiphytic 附生的 Growing as an epiphyte.
Equitant 套摺的 Folded over as if astride, e.g. the leaves of *Iris*.
Estipulate 無托葉 Without stipules.
Evanescent 速消 Soon disappearing.
Even pinnate 偶数羽状 A pinnate leaf ending in a pair of leaflets.
Evergreen 常緑的 Bearing green leaves all the year round.
Excavated 掘空的 Hollowed out.
Excurrent 貫頂的 Where the stem remains central, the branches being regularly arranged around it.
Exocarp 外果皮 Outer layer of the pericarp.
Exserted 伸出的 Protruding beyond, as stamens beyond the tube of the corolla.
Estipulate 無托葉的 Without stipules.
Exindusiate 無蓋的 Without indusia.
Extrorse 外向的 Directed outward, as when an anther opens outward.
Falcate 鐮形 Sickle-like.
Farinose 被粉的 Covered with a whitish mealy powder.
Fasciated 扁化的 When several stems have abnormally grown together.
Fascicle 束簇, 密繖花序 A close cluster of flowers or leaves.
Fasciculate, fastigiate 簇生的, 帚状的 Growing in dense clusters.
Ferrugineous 鉄銹色 Rust-colored.
Fertile 能育的 Capable of producing fruit
Fibrillose 細繊維 Formed of small fibers.
Fibrous 纖状, 繊維質 Containing such fiber.
fid 分裂 Cleft.
Filament 花絲 The stalk of an anther.
Filamentous 花絲的 Formed of filaments or fibers.
Filiform 絲状的 Thread-like.
Fimbriate 流蘇状 Fringed.
Flabellate 扇形 Fan-shaped.
Flagelliform 鞭状的 Like a whip.
Floccnlose 被叢捲毛的 Like wool.

Floret 小花 A small flower, as one unit of a grass spikelet.
Foetid 臭的 With a strong and disagreeable odor.
Foliaceous 葉状的 Leaf-like.
Foliate 具葉的 With leaves.
Foliolate 具小葉的 With leaflets.
Follicle 苞葵 A fruit composed of one carpel which opens along one side.
Free 離生 Not joined, the reverse of adnate.
Fringed 流蘇状 The margin bearing hair-like appendages.
Fruit 果實 The fertilized and developed ovary.
Frutescent 灌木状 Becoming shrubby.
Fugacious 先落的 Soon falling off.
Fulvous 黃棕色 Tawny, brownish yellow.
Fuscous 灰棕色 Dusky, brownish gray.
Fusiform 梭状 Spindle-shaped, tapering towards each end.
Gamopetalous 合瓣的 Having the petals united.
Geniculate 膝曲的 Abruptly bent.
Genus (pl. *genera*) 属 The smallest natural group containing distinct species.
Gibbous 浅囊状 With a pouch-like enlargement.
Glabrate 幾無毛 Almost glabrous.
Glabrous 無毛的 Smooth, without hairs.
Glabrescent 脫毛的 Becoming glabrous.
Gland 腺 A secreting structure.
Glandular 具腺 Having glands.
Glandular hair 腺毛 A hair with a gland at base or tip.
Glaucescent 苍白色 Somewhat glaucous.
Glaucous 白霜的 Covered with a waxy bloom, as a cabbage leaf.
Glomerate 團集的 Gathered into heads.
Glomerule 團散花序 A dense head-like cluster.
Glumes 穎片 The pair of scales which subtend a grass spikelet but do not directly enclose a floret.
Glumiferous 具穎的 Bearing glumes.
Glutinous 膠黏的 Covered with a sticky exudation.
Grain 穎果, 穀粒 The caryopsis or fruit of a member of *Gramineae*.
Granular 顆粒状 Composed of small particles.
Gregarious 群体 Growing in colonies.
Grit cell 石細胞 A cell of hardened stony texture, as in the fruit of the pear.
Gynobasic 基着 Applied to a style which is attached at the base of the ovary.
Gynophore 雌蕊柄 The stalk of a pistil within the flower.
Gynostemium 合蕊柱 The "column" of an orchid.
Halberd-shaped 戟形 Hastate.
Halophyte 塩生植物 A plant of salt marshes or other salty situations.
Hastate 戟形 Like an arrowhead, with basal lobes turned widely outward; halberd-shaped.
Haustorium 吸器 Root-like sucker of a parasitic plant, e.g. *Cuscuta*.
Head 頭状花序 A dense cluster of small flowers.
Herb 草本植物 A plant with no persistent stem above ground.
Herbaceous 草質的 Like an herb.
Herbarium 植物標本 A collection of dried plants.
Hermaphrodite, hermaphroditic 両性花 Having both sexes, e.g. with stamens and

pistils in the same flower.

Hesperidum 柑果 A syncarpous berry, pulpy within and covered with a rind, as the fruit of an orange.

Heterostylous 花柱異長 Having flowers with different forms of styles, as in *Primula*.

Hilum 種臍 The scar on a seed where it was attached.

Hip 薔薇果 The fruit of the rose.

Hirsute 具長硬毛 Covered with long rather distinct hairs.

Hirtellous 具微硬毛 Finely hirsute.

Hispid 具糙硬毛 With rough hairs or bristles, strigose.

Hispidulous 具短硬毛 Finely hispid.

Hoary 被灰白色 Grayish white, canescent.

Hooked 鉤狀 Curved or bent back at the tip.

Horned 角形 Spurred.

Husk 外殼 The outer covering of certain fruits.

Hyaline 透明的 Translucent, colorless.

Hybrid 雜種 A cross-breed between two species.

Hypanthium 托杯 An enlargement of the receptacle under the calyx.

Hypogynous 下位的 Attached under the pistil, but free from it.

Imbricated 覆瓦狀 Overlapping.

Immersed 沈水的 Growing under water.

Imperfect flower 不具備花 A flower lacking either pistils or stamens.

Incised 銳裂的 Cut sharply.

Included 內藏的 Not protruding from the surrounding organ.

Incomplete flower 不完全花 Wanting calyx or corolla.

Indefinite 無限的 Too many for easy enumeration.

Indehiscent 不裂的 Not splitting open regularly.

Indigenous 土著的 Not introduced.

Indurate 硬化 Hardened.

Indusium (pl. *indusia*) 被包 The shield or covering of the sorus in many ferns.

Inferior 下位的 Below, as an ovary located below the free portion of the calyx.

Inferior ovary 子房下位 Seeming to grow below the calyx.

Inflated 膨大的 Swollen.

Inflexed 內折的 Incurved.

Inflorescence 花序 The arrangement of flowers on the floral axis.

Infrastipular 托葉下 Below the stipules.

Integument 珠被 A covering of the ovule which becomes a seed coat.

Internode 節間 The portion of stem between two nodes.

Interpetiolar 葉柄間的 Between petioles.

Intrastaminеal 雄蕊內的 Within the ring of the stamens.

Introrse 內向的 Facing inwards.

Involucel 小總苞 A secondary small involucre.

Involucrate 總苞的 Belonging to an involucre.

Involucre 總苞 A ring of bracts surrounding several flowers, as in *Compositae*.

Involute 內捲的 Rolled inwards from the edges.

Irregular flower 不整齊花 A flower with bilateral symmetry, sometimes called asymmetrical.

Jointed 有関節 Falling apart at the joints, articulated.

Juvenile 幼態 Developing early.

Keel 龍骨瓣 A ridge like the keel of a boat.

Labiate 脣形 Lipped, usually bilabiate.
Lacerate 撕裂状的 With the margin torn.
Laciniate 条裂的 Cut into narrow lobes.
Lamellate 片状 Made up of thin plates.
Lamina 葉片 The blade or expanded part of a leaf.
Lanate 綿毛 Densely covered with wooly hairs.
Lanceolate 披針形 Lance-shaped; narrow and tapering to each end.
Lateral 側的 Fixed at the side, not terminal.
Latex 乳汁 The milky juice of such plants as *Lactuca*.
Laxly 疏鬆的 Loosely.
Leaflet 小葉 A division or blade of a compound leaf.
Legume 莢 The one-celled two-valved seed pod of *Leguminosae*.
Leguminous 豆類的 Related to a legume.
Lemma 外稃 The flowering glume of a grass spikelet, subtending the floret on the side away from the rachis.
Lenticels 皮孔 Corky spots on young bark.
Lenticellate 具皮孔 Having lenticels.
Lenticular 皮孔状 Like a lenticel.
Lepidote 具鱗片 Covered with small scurfy scales.
Liana 巨藤 A woody climbing vine.
Ligneous 木質的 Woody.
Ligulate 舌状的 With a ligule.
Ligule 葉舌, 托片 A strap-shaped appendage, (as a ray flower in *Compositae*, or a membranous appendage at the top of the leaf sheath in a grass.)
Limb 葉片, 冠簷 The expanded part of a leaf, a petal or a gamopetalous corolla.
Linear 線形 Narrow, and several times longer than wide.
Lip 脣瓣 The upper or lower portion of a bilabiate corolla or calyx.
Lobe 浅裂片 Any rounded division of an organ.
Lobulate 具小裂片 Having small lobes.
Locule 子室 The cavity of an ovary.
Loculicidal 室背開裂 Splitting through the back of each cell.
Lodicules 鱗片 A pair of small scales outside the stamens in some grass florets.
Loment 節莢 A legume which is constricted between the seeds, separating at maturity into 1-seeded joints.
Longitudinal 縦的 Lengthened in the direction of plant growth.
Lunate 半月形 Half-moon-shaped.
Lyrate 琵琶形 Lyre-shaped; pinnatifid with large terminal lobe and small basal lobes.
Marcescent 凋存 Withering but persistent.
Margin 邊緣 The edge, as of a leaf.
Massula 孢質塊 The hardened frothy mucilage enclosing a group of microspores in heterosporous ferns.
Megasporangia 大孢子囊 Sporangia which contains megaspores.
Megaspore 大孢子 The larger kind of spore when there are two kinds.
Membranaceous, membranous 膜質的 Like a thin membrane; thin and semi-transparent.
Mericarp 分果瓣 A portion of a fruit which splits away as a complete nutlet, an in *Umbelliferae*.
Mesocarp 中果皮 The middle layer of a pericarp.
Micropyle 珠孔 A small opening in the seed coat at one side of the hilum.
Microsporangia 小孢子囊 Sporangia which contain microspores.

Microspore 小孢子 The smaller kind of spore when there are two kinds.
Midrib 中脈 The main central nerve of a leaf.
Monadelphous 単体雄蕊 Describing stamens united by their filaments into one group.
Moniliform 念珠状 Like a string of beads.
Monochlamydeous 単被花 Having only one kind of perianth.
Monoecious 雌雄同株 Having unisexual flowers with both the staminate and pistillate borne on the same plant.
Monopodium 単軸 A stem with a single and continuous axis.
Monotypic 単型的 Applied to a genus having only one species.
Moor, moorland 湿荒地 An extensive area of marshy land covered with peat mosses and in which grow a variety of shrubs, chiefly of the heath family.
Morphological 形態的 Relating to the form and structure of organisms.
Mucilaginous 黏的 Slimy.
Mucro 短尖的 A sharp terminal point.
Mucronate 具短尖 Having a short straight point.
Mucronulate 具小短尖 Having a little mucro.
Multifid 多裂的 Cleft into many parts.
Multiple fruit 複果 A fruit resulting from several flowers in one mass.
Muriculate 瘤糙的 Roughened with very fine hard tubercles.
Mutant 突変種 Sport.
Naked bud 裸芽 One lacking the usual covering of bud scales.
Naturalized 帰化的 Introduced from a foreign country and flourishing wild.
Navicular 舟形 Boat-shaped.
Nec 不然 Not (Latin).
Nectaries 蜜腺 Organs which secrete nectar.
Nectariferous 具蜜腺 Nectar-bearing.
Nerve 脈 An unbranched vein or slender rib.
Net-veined 網状脈 Reticulated, with a system of irregularly crossing veins.
Neuter 無性的 Without sex.
Nigrescent 黒化 Turning black.
Node 節 The place on a stem where leaves are borne.
Nodose 節状 Nobby.
Nucellus 珠心 The central tissue of an ovary.
Nut 堅果 A hard indehiscent one-seeded fruit.
Nutlet 小堅果 A small hard one-seeded fruit.
Obcompressed 上下扁的 Flattened from top to bottom, not from side to side.
Obcordate 倒心形 Inversely heart-shaped, with a notch at apex.
Obdiplostemonous 外輪對雄的 Where the stamens are twice as many as the petals, the outer whorl being opposite the petals.
Oblanceolate 倒披針形 When the broadest part of a lanceolate blade is nearer the tip than the base.
Oblique 偏斜 With unequal sides.
Obovate 倒卵形 When the broadest part of an ovate blade is nearer the tip than the base.
Obsolete 消失的 Rudimentary or scarcely apparent.
Obtuse 鈍的 Blunt or rounded at the end.
Obtusish 略鈍 Somewhat obtuse.
Ocrea (pl. *ocreae*) 托葉鞘 A tubular stipule, as in *Polygonum*.
Odd-pinnate 奇数羽状複葉 Pinnate, with a single terminal leaflet.

Oleoresin 油樹脂 A natural mixture of resin with an essential oil, as in turpentine.
Olivaceous 灰綠色 Olive-colored; the color of an olive.
Orbicular 正圓形 A flat body with circular outline.
Ovary 子房 The part of a pistil which contains the ovules.
Ovate 卵圓形 Shaped like a longitudinal section of a hen's egg.
Ovoid 卵珠形 Egg-shaped.
Ovule 胚珠 A young seed in the ovary.
Ovuliferous scale 珠鱗 Ovule-bearing scale.
Palate 喉凸 A projection in the throat of some bilabiate corollas.
Pale, palea (pl. *paleae*) 內稃, 托苞 The inner bract of the two enclosing a grass floret, located between the floret and the rachilla, or the bract of a floret of *Compositae*.
Paleaceous 具托苞的 Having paleae.
Palmate 掌狀 Lobed or divided so that the sinuses point to the top of the petiole.
Palmatipartite 掌狀深裂 Very deeply cut in a palmate manner.
Pandurate, panduriform 提琴形 Fiddle-shaped; drawn in at the middle.
Panicle 圓錐花序 A branched raceme, usually loosely arranged.
Papery 薄紙質 Like paper.
Papilionaceous 蝶形花 Butterfly-shaped, as in the corolla of the *Papilionideae* in *Leguminosae*.
Papillae 乳頭 Soft protuberances.
Papillose 具乳頭 Covered with papillae.
Pappus 冠毛 The hairs, bristles or scales which represent the calyx in the flowers of most *Compositae*.
Paraphyses 隔絲 Sterile filaments in the fruiting bodies of cryptogams.
Parasite 寄生物 An organism which lives on another organism and gets nourishment from it.
Parietal 側膜式 Used to designate placentae borne on the outer wall of an ovary, rather than on its base or central axis.
Parthenogenetic 孤雌生殖 Where the ovary develops an apparently normal embryo and plant without fertilization.
Partition 隔壁 An internal wall, e.g. that which separates the cells of an ovary.
Pectinate 篦形 Pinnatifid, with segments like the teeth of a comb.
Pedate, pedatisect 鳥足狀 Palmately parted, with the lateral divisions two-cleft.
Pedicel 花梗 The stalk supporting a single flower.
Pedicellate 具花梗的 Borne on a pedicel.
Peduncle 總梗 A stout flower stalk, often supporting a cluster of flowers.
Pedunculate 具總梗的 Having a peduncle.
Pellucid 透明 More or less transparent.
Peltate 盾狀 To designate a leaf attached by its lower surface rather than its margin.
Pendulous 下垂的 Somewhat hanging or drooping.
Penninerved 羽狀脈 Pinnately nerved.
Pepo 瓠果 A gourd fruit, one-celled, many-seeded, inferior with parietal placentae, and pulpy within.
Perennial 多年生的 A plant which lives for several years.
Perfect 具備花 Used to indicate a bisexual flower.
Perfoliate 莖穿葉 When a stem appears to pass through a leaf, as in *Polygonum perfoliatum*.
Perforate 穿孔的 Pierced with holes or with transparent dots resembling holes.

Perianth 花被 The floral envelopes, especially when not readily distinguishable into calyx and corolla.
Pericarp 果皮 The wall of an ovary in fruit.
Perigonium 花盖 A perianth.
Perigynium 粒被 The flask-shaped sac enclosing the achene in *Carex*.
Perigynous 周位 Describing a flower in which the corolla and stamens are borne on the calyx tube, surrounding the ovary and remaining free from it, rather than being attached below.
Perispore 孢子周壁 The membrane or wall surrounding a spore.
Persistent 宿存的 Not falling off at the end of a single season, as the leaves of evergreens.
Petal 花瓣 One part of the corolla.
Petaloid 花瓣状 Petal-like.
Petalous 具花瓣 Having petals.
Petiolate 具柄 Having a petiole.
Petiole 葉柄 The stalk of a leaf.
Petiolule 小葉柄 The stalk of a leaflet.
Phyllaries 菊苞 Parts of the involucre in *Compositae*.
Phylloclade 葉状枝 A branch which appears and functions like a leaf.
Phyllode 葉状柄 A leaf-like petiole.
Pilose 疏柔毛 Having soft distinct hairs.
Pinna 羽片 A primary part of a pinnate leaf, especially in ferns.
Pinnate 羽状的 With leaflets arranged in two ranks along a central rachis.
Pinnatifid 羽状半裂 Pinnately cleft.
Pinnule 小羽片 A pinnate subdivision of a pinna.
Pistil 雌蕊 The female organ of a flower, consisting of ovary, style (when present) and stigma.
Pistillate 雌的 Having a pistil.
Pistillate flower 雌花 A flower having a pistil but no stamens.
Pit 窪点 A small depression.
Pith 髓 The spongy center of a stem.
Placenta 胎座 The area in the ovary where the ovules are borne.
Plaited 摺扇状 Folded.
Plicate 具摺的 Folded into plates.
Plumose 羽状 Feather-like, as a pappus of branched bristles.
Plumule 胚芽 The first leaf bud of an embryo.
Pod 荚 A dry many-seeded dehiscent fruit.
Pollen 花粉 The fertilizing powder produced in an anther.
Pollination 傳粉 The placing of the pollen on the stigma.
Pollinium 花粉塊 A body composed of the cohering mass of pollen grains from a single anther cell, as in Orchids.
Polygamo-dioecious 雜性異株 Dioeciously polygamous.
Polygamo-monoecious 雜性同株 Monoeciously polygamous.
Polygamous 雜性的 Describing a species which produces both bisexual and unisexual flowers.
Polymorphic 多型 Showing a variety of forms
Polypetalous 離瓣 Having distinct or separate petals.
Polysepalous 離萼 Having distinct or separate sepals.
Pome 梨果 A fleshy inferior fruit enclosing several papery or bony carpels, as in

Pyrus or *Crataegus*.

Pore 孔穴 A small opening, as that in anthers of *Ericaceae* through which the pollen grains escape.

Poricidal 孔裂的 Opening by pores.

Posterior 後端 Turned towards the axis; the opposite of anterior.

Prickle 皮刺 A sharp outgrowth of the rind or bark.

Process 突起 Any projecting appendage.

Procumbent 平舖的 Lying along the ground.

Proliferous 多育的 Bearing offshoots.

Prostrate 平臥的 Lying flat.

Prothallium (pl. *prothallia*) 原葉体 A usually flattened plant body developing from a spore and bearing sex organs.

Pseudobulb 假鱗莖 A thickened and bulb-like internode, as in some orchids.

Puberulent, puberulous 微柔毛 Slightly hairy.

Pubescence 短柔毛 Hairiness.

Pubescent 具短柔毛 Covered with soft hair.

Pulpy 肉質 Fleshy.

Punctate 腺点 Marked with dots, e.g. depressions or translucent glands.

Punctiform 点状 In the form of a dot.

Pungent 辛辣 With a rigid sharp point; having acrid taste or odor.

Pustulate 泡状突起 Blistered.

Pyrene 分核 A small stone of some drupe and pome type fruits.

Pyriform 梨形 Pear-shaped.

Raceme 總状花序 An inflorescence on an indefinitely elongating axis with equally pedicelled flowers.

Racemose 總状的 Having racemes.

Rachilla (*rhachilla*) 小穗軸 The axis of a grass spikelet.

Rachis (*rhachis*) 花序軸, 葉軸 The main axis of a grass inflorescence or of a compound leaf.

Radiate 輻射的 Bearing rays or ray florets.

Radical 根生的 Arising from the root or crown.

Radicle 胚根 The first root of the embryo.

Rank 級 A vertical row.

Raphe 種脊 A ridge on an inverted ovule which connects the base of the ovule with the stalk.

Raphides (*rhaphides*) 針晶体 Needle-shaped crystals in the cells of plants.

Ray flower 邊花 An outer enlarged flower, ligulate or tubular, from a head in *Compositae*.

Receptacle 花托 The enlarged tip of the peduncle or pedicel on which one or more flowers are borne.

Reflexed 反折的 Curved backward or downward.

Regular 整齐花 A type of symmetry with which a flower can be divided into equal parts along sections cut in various directions.

Remote 疏遠 Scattered.

Reniform 腎形 Kidney-shaped.

Resiniferous 具樹脂 Secreting resin.

Resinous 樹脂的 With resin.

Reticulate 網状 Netted.

Reticulation 網 Network.
Retrorse 倒向的 Pointing backward or downward.
Revolute 外捲的 Rolled backward from the margin.
Rhizomatous 具根莖 Like a rhizome.
Rhizome 根莖 A rootstock or underground stem.
Rib 肋, 稜 A prominent vein
Root climber 根攀植物 A plant which climbs by root-like holdfasts.
Root tuber 塊根 A modified tuberous root.
Rootlet 小根 A small root.
Rootstock 根莖 A rhizome or underground stem.
Rosette 蓮座葉 A cluster of leaves in circular form.
Rosulate 蓮座狀 Gathered in a rosette.
Rotate 輪狀 Wheel-shaped.
Rotund 圓形 Rounded.
Rudimentary 残留的 Imperfectly developed, vestigial.
Rufous 褐赤色 Reddish.
Rugose 麻皺的 Wrinkled.
Ruminate 嚙爛狀 Appearing as though chewed.
Runcinate 倒向羽裂 Sharply toothed, the teeth pointing backward.
Runner 繊匍枝 A slender prostrate branch which roots at the nodes.
Sac 嚢 A pouch.
Saccate 嚢狀 Bag-shaped.
Sagittate 箭頭狀 Shaped like the barbed head of an arrow, with two acute straight lobes at the base.
Salver-form 高脚碟狀 With a border spreading at right angles to a slender tube.
Samara 翅果 An indehiscent one-seeded fruit in which the ovary-wall is expanded into a wing, as in *Acer*.
Sap 植漿 The juice of a plant.
Saprophytic 腐生的 Living on humus.
Sarmentose 具長匍莖 Producing long runners.
Scaberulous 微糙 A little rough or scurfy.
Scabrid 略糙 Somewhat rough.
Scabrous 粗糙 Rough to the touch or scurfy.
Scale 鱗 A thin scarious reduced leaf.
Scaly 鱗片狀 Scale-like, or bearing scales.
Scandent 攀援的 Climbing.
Scape 花葶 A leafless peduncle.
Scapose 葶狀 Scape-like.
Scarious 乾膜質 Dry and membranous, not green.
Schizocarp 分果 A dry fruit which splits into one-seeded portions.
Scorpioid 蝎尾狀 When the main axis of the inflorescence is coiled.
Scrotiform 嚢狀 Pouch-shaped.
Scurfy 糠粃狀 With small scales on the surface.
Scutellum 盾片 A structure in the grass seed through which the germinating embryo absorbs nourishment from the endosperm.
Secund 偏向 One-sided, e.g. where the flowers are all turned in the same direction.
Seed 籽, 種子 A fertilized and matured ovule.
Seedcoat 種皮 Testa.
Seedling 苗 A young plant developing from a seed.

Segment 裂片，節段 One of the divisions, as of a leaf.
Sepal 萼片 A segment of the calyx.
Septate 具隔膜 Divided by a partition.
Septicidal 室間開裂 When a capsule dehisces along a septum.
Septum (pl. *septa*) 隔膜 A partition, as between the cells of a capsule.
Sericeous 絹毛，絹質 Covered with close-pressed silky hairs.
Serrate 鋸齒狀 Notched or toothed on the edge like a saw.
Serrations 鋸齒 Serrate teeth.
Serrulate 細鋸齒 Finely serrate.
Sessile 無柄 Without a stalk.
Seta (pl. *setae*) 剛毛 A bristle.
Setaceous 刺毛狀 Bristle-like.
Setose 具剛毛 Bristly.
Sheath 鞘，籜 Tubular or rolled part of an organ, e.g. the basal part of a grass leaf.
Shrub 灌木 A woody plant smaller than a tree and without a main stem.
Shrubby 灌木狀 Like a shrub.
Silicle 短角 A short pod, not much longer than wide, as in some *Cruciferae*.
Silique 長角 The typical long pod of many *Cruciferae*, several times longer than broad.
Silky 絹狀 Sericeous, glossy.
Silvery 銀色 Shining white or shining gray.
Simple 単的 Of one piece.
Simple leaf 単葉 A leaf with one blade.
Sinuate 深波狀 With a wavy margin.
Sinus 湾缺 The angle between the segments of a cleft organ, as a leaf, a calyx or a corolla.
Smooth 平滑 Not rough, without hairs.
Solitary 単生 Single.
Soriferous 具囊群 Bearing sori.
Sorus (pl. *sori*) 子囊 A cluster of sporangia in ferns.
Spadix 肉穗花序 A fleshy spike.
Spathaceous, spathate 具佛焰苞 Spathe-bearing.
Spathe 佛焰苞 A large sheathing bract enclosing a spadix.
Spatulate, spathulate 匙形 Shaped like a spatula, oblong but narrower at the base.
Species 種 A category of classification lower than a genus, the individuals of which do or may interbreed.
Spicate 穗狀 Like a spike.
Spiciform 穗狀 With the form of a spike.
Spiculate, spiculiferous 具細刺 Covered with sharp points.
Spike 穗狀花序 An inflorescence on an indefinitely elongating axis with sessile flowers.
Spikelet 小穗 A secondary spike in *Cyperaceae*; a cluster of one or more flowers subtended by a pair of glumes in *Gramineae*.
Spine 刺 A sharp-pointed woody hardened body, usually a modified branch.
Spinescent 刺狀 Ending in a spine.
Spinulose 具小刺 With small spines.
Spiny 具刺 Having spines.
Spongy 海棉狀 Like a sponge.
Sporangiophore 子囊柄 A stalk bearing a sporangium.
Sporangium (pl. *sporangia*) 孢子囊 A spore-case in ferns.
Spore 孢子 A cell, in cryptogams, which becomes free and functions like a seed

Sporocarp 孢子果 In the water ferns, a sac which encloses a cluster of sporangia.
Sporophyll 孢子葉 A leaf which bears spores.
Sport 芽変種 A sudden deviation starting from a bud or seed.
Spur 短枝, 距 Of a flower, a hollow slender usually nectariferous extension of the corolla, as in *Viola*; or of the calyx, as in *Delphinium*.
Squamate 具鱗片 Having scales.
Squamella (pl. *squamellae*) 小鱗片 A little scale.
Stamen 雄蕊 A male sporophyll.
Staminal 属雄蕊的 Relating to stamens.
Staminate 雄的 Bearing only stamens, not pistils.
Staminode, staminodium 退化雄蕊 A sterile stamen.
Standard 旗瓣 The large back petal of a papilionaceous corolla.
Stellate 星状 Star-shaped.
Sterile 不育的 Barren, as a flower without pistil or a stamen without anther.
Stigma 柱頭 The part of the pistil which receives the pollen.
Stigmatic 柱頭的 Relating to the stigma.
Stinging hair 螫毛 A hollow hair with a gland at the base which secretes an irritating fluid.
Stipe 柄 The support of an ovary within the flower.
Stipellate 具小托葉 Having stipels.
Stipels 小托葉 The stipules of a leaflet.
Stipitate 具柄 Having a stipe.
Stipular 具托葉 Having stipules.
Stipules 托葉 The pair of appendages at the base of the petiole on some leaves.
Stolon 匍匐莖 A runner; a prostrate branch which roots at the nodes.
Stoloniferous 具匍匐莖的 Producing stolons.
Stoma (pl. *stomata*) 気孔 A breathing pore in the epidermis of a leaf surrounded by two guard cells.
Stomatic 気孔的 Pertaining to stomata.
Stramineous 麥桿色 Straw-colored.
Strap-shaped 帯状 Long, flat and narrow.
Striate 具条紋 Marked with fine longitudinal parallel lines.
Strigose 糙伏毛 Hispid, with rough hairs or bristles.
Strobilus (pl. *strobili*) 球果, 球穗花序 A cone; an inflorescence made up of overlapping scales.
Stylar 花柱的 Pertaining to a style.
Style 花柱 The slender part of a pistil, when present, between the ovary and the stigma.
Stylopodium 柱基 The enlargement at the base of the style in *Umbelliferae*.
Sub- 幾乎, 亜 A prefix indicating somewhat, e.g. *subadpressed*, somewhat adpressed.
Subfamily 亜科 A group of genera within a family.
Subgenus 亜属 A section of a genus.
Submersed 沉水的 Growing under water.
Subspecies 亜種 A division of a species.
Subtend 包括, 對向 To enclose or embrace in its axil, as a bract subtending a flower; opposite to.
Subterranean 地下的 Underground.
Subulate 鑽状 Awl-shaped.
Succulent 肉質的 Fleshy.

Sucker 吸根, 根出条 A shoot originating underground.
Suffrutescent, suffruticose 半灌木状 Somewhat shrubby.
Sulcate 具槽的 Grooved or furrowed.
Superior 上位的 Of an ovary when the calyx and corolla are inserted below it.
Suture 縫 A junction or union, as between 2 carpels.
Syconium 隱頭花序 A hollow multiple fruit, as that of *Ficus*.
Sympodium 合軸 A stem made up of a series of superposed branches appearing like a single axis, as in *Vitis*.
Synantherous 聚約的 Where stamens are united by their anthers.
Syncarp 合心皮果 A fleshy multiple or aggregate fruit.
Syncarpous 合心皮的 Composed of 2 or more united carpels.
Tap root 主根 A root with a stout tapering body.
Tawny 黃褐色 Fulvous, brownish yellow.
Tendril 卷鬚 A filiform outgrowth of stem or leaf by which a plant may climb.
Terete 圓柱形 Cylindric.
Terminal 頂生 At the end or apex.
Terminal bud 頂芽 A bud which is apical.
Ternate 三出的 In threes.
Terrestrial 陸生 Used for plants of the dry ground.
Testa 外種皮 The outer, usually hard, coat of a seed.
Tetradynamous 四強雄蕊 Having 4 long stamens and 2 short, as in *Cruciferae*.
Tetragonous 四稜的 4-angled.
Thallus 葉状体 A green plant body not separated into stem and leaf.
Thorn 刺 A sharp-pointed modified branch.
Thorny 具棘刺 With thorns.
Throat 冠喉 The mouth of a gamopetalous corolla.
Thyrsoid 聚繖状 Like a thyrsus.
Thyrsus 聚繖圓錐花序 A mixed inflorescence in which the main axis is like a panicle while the branches are cymose.
Tomentose 被絨毛 Covered with dense matted hairs.
Tomentulose 被微絨毛 Somewhat tomentose.
Tomentum 絨毛 A dense mat of hairs.
Toothed 具齒的 Dentate.
Torulose 念珠状 Knobby; where a cylindric body is swollen at intervals.
Torus 花托 The receptacle of a flower.
Trailing 蔓延的 Prostrate, but not rooting.
Transverse 橫的 Across.
Tree 喬木, 樹 A woody plant with an evident trunk.
Trichome 毛 A hair-like outgrowth of the epidermis.
Trichotomous 三歧的 3-forked.
Trifoliate 具三葉的 3-leaved.
Trifoliolate 具三小葉 With 3 leaflets.
Trigonous 三稜的 3-angled.
Triquetrous 三稜的 Sharply 3-angled.
Truncate 截形 As though cut off at the end.
Tube 管, 筒 The united part of a gamopetalous corolla, or of a calyx.
Tuber 塊莖 A thickened underground branch.
Tubercle 小塊莖, 小瘤 A little tuber.
Tuberous 塊莖状 Like a tuber.

Tuberculate 瘤状, 具小瘤 Covered with knobby projections.
Tuberoid 塊茎状 Resembling a tuber.
Tubular 管状 Hollow, like a pipe.
Tunicate 具膜被 Coated
Turbinate 陀螺状 Shaped like a top.
Turgid 膨状 Swollen, but not with air.
Twig 極枝 A small shoot or branch.
Twiners 纏繞莖 Plants which climb by stems which twine around their support.
Twining 纏繞 Winding spirally.
Umbel 繖形花序 A flower cluster in which the pedicels arise from one point like the ribs of an umbrella.
Umbellate 繖形的 Arranged in umbels.
Umbo 鱗臍 The central point of a cone scale, as in *Pinus*.
Uncinate 具鈎的 Hooked.
Undershrub 半灌木 A low shrub, particularly one growing near or under taller shrubs or trees.
Undulate 波状的 Wavy.
Unifoliate 具一葉 With a single leaflet.
Unilaterally 単面的 In a one-sided manner.
Unilocular 単室的 One-celled.
Unisexual 単性的 Of one sex.
Urceolate 罎状 Contracted at the mouth; urn-shaped.
Utricle 胞果 A membranous bladdery sac enclosing an achene, or the whole fruiting structure including both sac and achene.
Vaginate 具鞘的 Sheathed.
Vallecular 具溝稜的 Having grooves with ridges between, as the fruit of *Umbelliferae* or the stems of *Equisetum*.
Valvate 瓣裂, 鑷合状 Opening by valves; parts meeting in a flower bud but not overlapping.
Valve 活瓣, 裂片 A partially detached lid of an anther pore; a section of a dehiscent capsule.
Valvular 瓣裂 Opening by valves.
Variegated 異色的 Irregulary colored; blotched.
Varietal 変種的 Pertaining to a variety.
Variety 変種 A subdivision of a species.
Vascular 維管的 Relating to vessels.
Vegetative 営養的 Relating to a growing shoot, rather than to an inflorescence.
Vein 脈 A strand of vascular tissue in a leaf.
Veinlet 細脈 A small vein.
Velum 子嚢幕 A membrane; particularly the membrane covering the sporocarp in *Isoetes*.
Velvety 被茸毛 Soft-hairy.
Venation 脈序 The arrangement of veins in a leaf.
Ventral 腹面的 The inner face, as of a leaf or carpel.
Vernation 幼葉捲疊式 Arrangement of leaves in the bud.
Verrucose 多疣的 Warty.
Versatile 丁字着 Turning freely on its stalk.
Vertex 尖 Tip.
Verticillate 輪生 Whorled.

Vescicle 小泡 A small bladder or cavity.
Villose 長柔毛 With long weak hairs.
Virgate 帚状 Wand-shaped, as a long straight slender twig.
Viscid 黏的 Sticky.
Viviparous 母株萌発的 Sprouting while attached to the parent plant.
Whorled 輪生 Arranged in circles around the stem.
Wing 翅, 翼瓣 Any membranous expansion of an organ.
Withe 柔靱枝 A pliable twig.
Woody 木質 Of stems and roots which become hardened, lignified.
Xerophytic 旱生 Dry; able to live with a small amount of moisture.
Zygomorphic 両側對称 Of flowers which can be divided into equal halves along one plane only.

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